THE

AMERICAN GAS-LIGHT JOURNAL.

THE OFFICIAL GAZETTE OF

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

Rooms—No. 39 Nassau Street, cor. Liberty Street, opposite the Post-Office, New York.

LONDON:—TRUBNER & CO., No. 60 PATERNOSTER ROW.

VOL. III.—No. 55. NEW-YORK, TUESDAY, APRIL 1, 1862. $3 PER ANNUM.

HERRING'S PATENT

Champion Fire-Proof Safes.

Herring's Champion Burglar-Proof Safes, with Herring & Floyd's New Patent Crystalized Iron, the only metal which cannot be drilled.

Nearly 25,000 Herring's Safes have been made and sold, and over 500 have passed triumphantly through accidental Fires, thus fully sustaining their acknowledged and well-earned character as the "best Fire-Proof Safes the world ever saw."

Herring's New Patent Burglar-Proof Safes, made of a combination of Wrought Iron, Patent Crystalized Iron, and Bars of Steel, are confidently offered to the public as the strongest and best security against skilful burglars now extant.

It was a "Herring's Burglar-Proof Safe," the public will remember, which so lately held secure its trust against the determined ingenuity of the boldest and greatest mechanical burglars this country has ever known, and saved for the New York Exchange Bank no less than

HALF A MILLION OF DOLLARS.

Herring's Patent Fire and Burglar-Proof Safes *combined*, (one Safe within another,) making the most perfect protection from fire and thieves now known.

FIVE OF HERRING'S SAFES VICTORIOUS!

WELLSBORO', Penn., December 21, 1861.

Messrs. Herring & Co., New York:

Gentlemen,—At the great fire which occurred here on the 18th December last, my store, with a number of other buildings, was entirely destroyed; no less than seven places of business were burnt out and five of your safes severely tested, in every instance saving their entire contents, to the complete and perfect satisfaction of the owners. Two of your Herring's Patent Champion Safes which were in my building remained there through the entire conflagration, and were not opened until the day after the fire. No water was thrown on the building. Everything in my safe after the fire was nearly as good as new. C. L. Wilcox also preserved all his books, papers, and money in two of your safes, both being in same fire. Wm. Roberts was also the fortunate owner of another of your Patent Champion Safes, which was severely tested, and saved completely his books, papers, and money. The result has given great satisfaction, and we want no safe but Herring's Champion. Please send me one same size I last bought of you immediately. Send by N. Y. & Erie R.R. via Tioga depot. JOHN R. BOWEN.

I had two of Herring's Safes in above fire. They saved my books, papers, and $2,000 *in bank bills.* C. L. WILCOX.

HERRING'S PATENT CHAMPION saved my books, papers, and about $400 in *paper money.* I would use no other. WILLIAM ROBERTS.

GREAT FIRE IN PEARL AND FULTON STS.

NEW YORK, Jan. 27, 1862.

Messrs. HERRING & Co., No. 251 Broadway:

Gentlemen,—The large HERRING'S PATENT CHAMPION SAFE you made for me a few years ago has been put to a severe test in the great fire corner Fulton and Pearl sts., on the 26th inst., which entirely destroyed my building, together with many others.

The fire commenced about 6 o'clock on Sunday morning, and the safe was taken from the ruins after an exposure of more than thirty hours.

Your Safe contained all my books, insurance policies, and other valuable papers besides, gold and silver, bank bills, coupon bonds, &c., amounting to over Two Hundred Thousand Dollars. Everything in the Safe is in perfect order, except the binding of the books being steamed.

Your Patent Champion Safe gives us great satisfaction, and has guarded safely through the fire every dollar of its contents.

Truly yours, A. S. FOSTER.

GREAT FIRE IN NEW JERSEY.

NEW BRUNSWICK, N. J., January 18th, 1862.

Messrs. HERRING & Co.,

No. 251 Broadway, New York:

Gentlemen,—At the recent extensive fire in our city, on Wednesday morning last, 15th inst., I was the fortunate owner of one of your HERRING'S PATENT CHAMPION SAFES, which contained some books and a number of valuable papers.

The heat in my store was very great, and the safe subject to an intense heat. I felt great interest in the safety of my papers, as a number of castings in my store and within a few feet of the safe were melted. Nothing, indeed, was saved in my building, except the contents of your safe, which I am happy to inform you was completely preserved, after a thorough roasting for some seventeen hours. The result has exceeded my anticipations, and fully confirmed my confidence in the security of your Herring's Patent Safe. Please send me another of larger size, and refer all incredulous to my books and papers, which it gives me great pleasure to show.

WM. H. ARMSTRONG.

Herring & Co., 251 Broadway.
Farrel, Herring & Co., Phila.
Herring & Co., Chicago.

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BERGEN IRON WORKS, Established 1833.

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MERRICK & SONS, Engineers, Manufacturers of every description of Gas Machinery

Retorts, Bench Castings, Condensers, Washers, Scrubbers, Wet or Dry Lime Purifiers, Coke Wagons, Fire Tools, Wrought Iron Grate Bars, Gasholders, either TELESCOPIC OR SINGLE, WITH SUSPENSION FRAMES COMPLETE; Wrought Iron Roof Frames, for Iron or Slate; Stop Cocks, Exhausters, Steam Pumps, Boilers and Tanks, Steam or Hand Air Pumps for proving Street Mains, Centre Seals, Governors, Wrought or Cast-Iron Lime Sieves for Purifiers, Purifier Hoisting Machines, &c, &c.

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HERRING & FLOYD, proprietors, manufacture Gas Compensators of all sizes, Self-Acting Valves, Exhausters upon an improved plan, costing less than half those of English manufacture, also castings of every description for Gas and Water Works.

Herring & Floyd offer for sale Sabbaton's Patent Screening Shovels for coke and coals, made of malleable iron, of all sizes; Sabbaton's Patent Improved Cast Iron Furnace Frame and Door, arranged to protect the iron work of the door and frame from direct contact with the fire; also, Floyd's Patent Malleable Iron Retort Covers, only quarter of an inch thick, but of convex form, and of great strength, as is attested by certificates from several of the leading Gas-works in America. For engravings of all the above patents see AMERICAN GAS-LIGHT JOURNAL for October, 1859, pages 65 and 71.

Samples of the above castings can be seen at the Rooms of the AMERICAN GAS-LIGHT JOURNAL.

COLWELL & CO., Manufacturers, of Pig Iron and Cast Iron Gas and Water Pipes, No. 207 North Water street and 206 North Wharves, Philadelphia.

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205½ Walnut Street, Philadelphia.

R. D. WOOD & CO.,
MANUFACTURERS OF
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Office, 400 Chestnut Street,
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TO GAS AND WATER COMPANIES.

The undersigned, Agent for Messrs. Thomas Edington & Sons, Phenix Foundry, Glasgow, Scotland, is prepared to contract for all descriptions of Cast-Iron Pipes of their manufacture.

About 6,000 tons of these Pipes have lately been supplied to the Brooklyn Water-works, N. Y., and the Chief Engineer of the Works, A. P. Kirkwood, Esq., is ready to testify to their excellent quality.

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Sole Agent for the United States and Canada.

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[ESTABLISHED 1821,]

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GALVANIZED WROUGHT IRON TUBES,

ARTESIAN WELL PIPES,

of Wrought or Cast-Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal Gas-works,; Cast-Iron Street Mains, Bends, Branches, Drips, &c.

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STEPHEN MORRIS, CHAS. WHEELER,
THOMAS S. TASKER, STEPHEN P. M. TASKER.

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N. B.—A complete selection of Patterns on hand. Refer to any of the Gas-Works in the Western and Southwestern States.

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Croton Aqueduct dept., N. Y.
Manhattan Gas Lt. Co., N. Y.
Brooklyn Water dept., N. Y.
Brooklyn Gas Lt. Co., N. Y.
Citizens' Gas Lt. Co., Brooklyn, N. Y.

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WATER-GAS.—APPLETON & GRAHAM,

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UNDER THE SANDERS PATENT,

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☞ Coal or Rosin Gas-Works altered at small expense.

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For Towns, Villages, Factories, Steamboats, or any place where steam can be easily had, we have an apparatus which will produce any quantity of rich illuminating gas, by merely decomposing the steam, and passing it through Coal Tar, or any other liquid Hydro-Carbon, the gas costing only 75 cents per 1,000 feet. It requires no purifier or gasometer, as it generates only sufficient gas for the burners lighted, the quantity being gauged by means of a self-acting regulator.

All orders for apparatus or rights must be addressed to the

CARBONIZED GAS COMPANY,
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We will also furnish plans and estimates for Gas-Works of any size, and erect the same on satisfactory terms.

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ILLUMINATING OIL,

Unsurpassed by any KEROSENE manufactured. Is nearly COLORLESS, of a PLEASANT ODOR, and burns without smoke, or crusting the wick. WARRANTED NON-EXPLOSIVE.

For sale in any quantity at a greatly reduced price.

Packed in cans and cases for foreign markets. Apply to U. TALLMAN,
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COAL OIL! COAL OIL!! of the celebrated brand of "SILVER SPRING." A superior burning oil, white, pure, safe, and odorless.

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Maiden Lane.

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The patent Mica Chimneys for coal-oil Lamps possess many advantages over the glass chimneys. They do not break from the heat, falling, cleaning, or any ordinary usage. When one is purchased it will last, with care, as long as the lamp. They fit all the burners now in use.

AMOS HORNING,
Agent for Manufacturer,
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N. B.—Coal-Oil Lamps and Coal-Oil at low rates.

PATENTED OCT. 8, 1861.

Dithridge's Patent

OVAL LAMP CHIMNIES,

for Coal-Oil burners. Manufactured of

XX FLINT GLASS.

These chimnies are intended for the flat flame which, heating all parts of the glass equally, does not expose it to cracking.

E. D. DITHRIDGE,
Fort PittGlass Works,
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THE LOVERS' LAMPS.—Price Five Shillings ($1.25) each. To supersede Candles and Night Lights. No Dressing or Trimming required.

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Post-Office orders attended to.

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PATENT
COAL-OIL, NO-CHIMNEY BURNER,

For Portable LAMPS, LANTERNS, Etc. Requires no Chimney.

Address,
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COAL OIL, FOR BURNING.—FINE quality, 40 to 50 cents per gallon, according to quantities. Dealers and consumers can obtain it at the above rates of XAVIER GEX, coal-oil refiner, 75 William street.

AGENTS.—TO ALL WHO USE Candles.—The Candle Lamp just out. Safety and economy in light. No excuse for using explosive fluids. No dropping of tallow on carpets. The Candle Lamp will be sent free on receipt of 25 cents. Agents, male and female, can make a larger profit, and find a quicker sale for the Candle Lamp, than any article yet offered to the public. Send red stamp for illustrated circular.

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MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS.

MANUFACTORIES

SUFFOLK ST. CLERKENWELL GREEN. & ALLEN ST. GOSWELL ST. LONDON.

BOSTON, MASS., 1 BARRETT STREET,—August 2, 1860.

RICHARD GLOVER

BEGS TO INFORM

GAS COMPANIES AND CONTRACTORS

THAT HE HAS ALWAYS ON HAND A LARGE ASSORTMENT OF

THOMAS GLOVER'S (of London) CELEBRATED

DRY GAS METERS.

THOMAS GLOVER'S Meters have now been in use in the United States and British Provinces, for the last FOURTEEN YEARS, and are extensively used by many Gas Companies, to their entire satisfaction; and R. GLOVER can with all confidence refer to them in proof that THOMAS GLOVER'S Meters are— the most PERFECT in PRINCIPLES— the most CORRECT in REGISTRATION—and more DURABLE than any other Dry Gas Meter made in the United States or Great Britain. R. GLOVER will at all times be glad to repair any Gas Meters sent him at the above factory. If any of them are of THOMAS GLOVER'S manufacture, and of a more recent date than THREE years, he will make no charge.

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STATION, SHOW, & EXPERIMENTAL METERS,
Photometers, Pressure Registers, Indicators, and Gages, Governors, Meter Provers, Centre Seals, Fluid Gages, &c.
GAS APPARATUS
Of the most reliable and approved construction manufactured and on hand at the
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☞ Any newspaper that will give the above advertisement one or more insertions, and send to the publisher a marked copy, will receive the book by return mail, post paid.

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CANNEL & COAL,
FOR
Gas-Manufacturers and House Use.
The careful shipment of the best qualities, of Cannel and Coal, at the lowest rates current at the time of engagement guaranteed.
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Dealers can be supplied by lighters, at their yards, from ships Vanguard and New World, now discharging, and from other vessels to arrive.
Apply to RICHARD THACKRAY,
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F. BUTTS & CO. (Successors to BUTTS & KENDALL),
DEALERS IN THE CELEBRATED
Sterling Coal
Pittsburgh and other Gas Coals,
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FREEZING OF GAS-PIPES.—Walton's Patent Anti-Freezing Apparatus illustrated by Engravings in the AMERICAN GAS-LIGHT JOURNAL, of Jan. 1, 1861, page 212, is the most simple, durable and efficient of any known process.
See also certificates from Cincinnati, O., and Louisville, Ky. Gas-Works in same number, page
Address, JOHN WALTON,
Sup't Gas-Works, Louisville, Ky

GAS-METER FLUID.

FLUID FOR GAS-METERS.—The undersigned is prepared to furnish the Glycerine Meter Fluid in quantities to suit purchasers. *It does not evaporate, can be made to stand any degree of cold liable to occur in this country or in Canada, and does not corrode the metals of the meter. It has been in use successfully for the last three years.*
For particulars, references, &c., address the manufacturer, HENRY BOWER,
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STRATTON & BROTHER'S PATENT GAS-WORKS, for making Gas from ROSIN or COAL OILS. STRATTON'S Patent Double Retort, for Coal, Wood, or Rosin.
Our Patent Gas Works have been put up in some forty Country Residences, Factories, Churches, &c., in which an experience of *ten years* gives entire satisfaction.
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ROSIN GAS-WORKS,
FOR
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As well as for Consumers in Large Cities.
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FOR LIGHTING RAILROAD CARS AND STEAMBOATS
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The whole process of Filling the Gas-Holders of a Railway Train, requires but Three Minutes.
Apply to the
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DRAIN PIPES, ENGLISH AND AMERICAN.
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Minton's Encaustic Tiles.
For Sale by
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DANIEL THOMPSON, Machinist and Manufacturer of Stop-Cocks, Fire-Plugs, &c., for Water-Works, Stop-Cocks, Valves, Drip Pumps, &c. for Gas-Works, No. 133 Elfreth Alley, Philadelphia.

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WROUGHT-IRON WORK FOR GAS AND WATER WORKS.
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POOLE & HUNT, BALTIMORE, MD., are prepared to execute orders for
GAS-HOLDERS,
IRON-ROOF FRAMING,
And all other descriptions of
Iron Work for Gas-Works, Water-Pipes, and Heavy Castings, and Machinery generally.

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We are now publishing regularly the names of the thirty thousand post-towns in the United States, so that builders of gas-works and water-works, and the various manufacturers, may see where are new openings for business. And as each post-master will receive several copies of the AMERICAN GAS-LIGHT JOURNAL, for distribution, the number thus circulated will probably exceed *Three Million Copies. What a chance for advertisers!*

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ARRANGED BY STATES AND COUNTIES,

Showing where Gas-Works and Water-Works are Wanted.

OHIO.

88 Counties, 1,959 Towns, 32 Gas-Works, 5 Water-Works.

(*Concluded from page 275.*)

Seneca County—(*Continued.*)

Fostoria, Green Spring, Melmore, Palo Alto, Reedtown, Republic, *Tiffin*, (c. h.) Watson's, Watson's Station, West Lodi.

Shelby County.

Anna, Dinsmore, Hardin, Houston, Jackson Centre, Lockington, Loramie's, Montra, Pemberton, Plattsville, Pratt, Sidney, Tawawa, Wynant.

Stark County.

Alliance, Barryville, Cairo, Canal Fulton, *Canton*, (c. h.,) East Greenville, Frease's Store, Freeburg, Greentown, Hartville, Lake, Limaville, Louisville, McDonaldsville, Magnolia, Mapleton, Marlborough, Massillon, Maximo, Middle Branch, Minerva, Mount Union, Navarre, New Baltimore, New Berlin, New Franklin, North Industry, North Lawrence, Osnaburgh, Pallow, Paris, Pierce, Waynesburgh, West Brookfield.

Summit County.

Akron, (c. h.,) Bath, Boston, Clinton, Copley, Cuyahoga Falls, Ghent, Hudson, Inland, Johnson's Corners, Macedonia Depot, Middlebury, Mogadore, New Portage, Nimisila, Northfield, North Springfield, Norton Centre, Peninsula, Richfield, Summit, Tallmadge, Twinsburgh, Western Star.

Trumbull County.

Bazetta, Braceville, Bristolville, Brookfield, Burgh Hill, Church Hill, Duck Creek, Eden, Farmington, Fowler, Girard, Greensburgh, Gustavus, Hartford, Howland, Hubbard, Johnsonville, Kinsman's, Mecca, Mesopotamia, Newton Falls, Niles, North Bloomfield, Ohl's Town, Orangeville, Southington, Sugar Creek, Vernon, Vienna, *Warren*, (c. h.,) Willow Dale.

Tuscarawas County.

Albany, Bolivar, Brady, Buena Vista, Cadwallader, Canal Dover, Deardorff's Mills, Dundee, Gilmore, Gnadenhutten, Johnson, Mineral Point, New Comerstown, New Cumberland, *New Philadelphia*, (c. h.,) Peoli, Port Washington, Rocksford, Rogersville, Sandyville, Shanesville, Stillwater, Stone Creek, Strasburgh, Tabor, Tuscarawas, Uhricksville, Winfield, Zoar.

Union County.

Allen Centre, Boke's Creek, Byhalia, Coberly's, Darby Plains, Irwin, Jerome, *Marysville*, (c. h.,) Milford Centre, New California, New Dover, Pharisburgh, Raymond's, Richwood, Rush Creek, Taylor Centre, Unionville Centre, Watkins, Wilkins, York.

Van Vert County.

Auglaize, Delphos, Dixon, Leslie, Middle Point, Tully, *Van Wert*, (c. h.,) Willshire.

Vinton County.

Allensville, Big Sand Furnace, Dundas, Eagle Mills, Elk, *McArthur*, (c. h.,) Mingo, New Plymouth, Reed's Mills, Swan, Vinton Station, Wilkesville, Zaleski.

Warren County.

Butlerville, Carlisle Station, Dallasburgh, Deerfield Village, Dunlevy, Edwardsville, Fort Ancient, Franklin, Harveysburgh, Hopkinsville, *Lebanon*, (c. h.,) Level, Mainville, Mason, Morrow, Mount Holly, Oregon, Pleasant Plain, Red Lion, Ridgeville, Springboro', Twenty Mile Stand, Waynesville.

Washington County.

Aurelius, Barber, Barlow, Barlett, Belpre, Beverly, Big Run, Bonn, Brown's Mills, Centre Belpre, Coal Run, Constitution, Decaturville, Dunbar, Dunham, Fearing, Fillmore, Flints Mills, Grand View, Harmar, Lawrence, Layman, Liberty Hill, Little Hockhocking, Lowell, Lower Lawrence, Lower Newport, Lower Salem, *Marietta*, (c. h.,) Moss Run, New Metamoras, Newport, Olds, Ostend, Regnier's Mills, Saltpetre, Tunnell, Veto, Vincent, Waterford, Watertown, Wesley.

Wayne County.

Apple Creek, Baughman, Big Prairie, Blachlysville, Burbank, Canaan, Cedar Valley, Chippewa, Congress, Dalton, Easton, East Union, Fredericksburgh, Golden Corners, Koch's, Madisonburgh, Marshallsville, Mill Brook, Mooreland, Mount Eaton, New Pittsburgh, New Prospect, Old Hickory, Orrville, Plain, Reedsburgh, Shreve, Smithville, West Lebanon, West Salem, *Wooster*, (c. h.,)

Williams County.

Bridgewater, *Bryan*, (c. h.,) Deer Lick, Domestic, Durbin's Corners, Edgerton, Lockport, Luke's Corners, Montpelier, Nettle Lake, North West, Pioneer, Primrose, Pulaski, Saint Joseph, Spring Lake, Stryker, West Buffalo, West Unity, Williams Centre.

Wood County.

Bowling Green, Bloom, Brown's Corners, Gilead, Lovetts' Grove, Millbury, Miltonville, Montgomery Cross Roads, New Rochester, *Perrysburgh*, (c. h.,) Portage, Prairie Depot, Scotch Ridge, Stony Ridge, Tontogany, West Mill Grove, Weston, Woodbury.

Wyandott County.

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OREGON.

Benton County.

Corvallis, (c. h.,) King's Valley, Liberty, Starr's Point, Tampico.

Clackamas County.

Hood River, Milwaukie, Needy, *Oregon City*, (c. h.,) Oswego, Sandy.

Clatsop County.

Astoria.

Columbia County.

Rainier, *St. Hellen*, (c. h.)

Coos County.

Empire City.

Curry County.

Port Orford.

Douglas County.

Alberbrook, Galesville, Myrtle Creek, North Cranyonville, Oakland, Roseburgh, Round Prairie, Winchester.

Jackson County.

Ashland Mills, Applegate, Gold River, *Jacksonville*, (c. h.,) Phœnix.

Josephine County.

Kerby, Leland, State Creek, Vannoy, Waldo.

Lane County.

Cottage Grove, *Eugene City*, (c. h.,) Franklin, Freedom, Grand Prairie, Long Tom, McKenzie, Othello, Pleasant Hill, Sinslaw, Smithfield, Williamette Forks.

Linn County.

Albany, (c. h.,) Calapooya, Central, Diamond Hill, Harrisburgh, Peoria, Pine, Santiam, Union Point, Washington Butte.

Marion County.

Ashland Mills, Aurora Mills, Butteville, Champoag, Fairfield, Parkersville, *Salem*, (c. h.,) Silverton, Sublimity.

Multnomah County.

Portland, (c. h.)

Polk County.

Bloomington, Bridgeport, *Dallas*, (c. h.,) Eola, Etna, Independence, Lackemute, Lawn Arbor, Monmouth, Plum Valley, Salt Creek, Valfontis.

Umpqua County.

Elkton, (c. h.,) Kellogg's, Locust Grove, Scottsburg, Umpqua City, Yoncalla.

Wascopum County.

Wascopum, (c. h.)

Washington County.

Forest Grove, *Hillsborough*, (c. h.,) Souvies Island, Wapato.

Yam Hill County.

Amity, Dayton, *Lafayette*, (c. h.,) McMinville, Mount Hood, Muddy, North Yam Hill, Washington, Willamina.

SEWAGE.—The filth which, under the veiled term of sewage, is allowed to ferment and fill our houses and streets with gases of ineffable subtlety, includes much more than mere water-closet liquescencies. There are the percolations of crammed churchyards, the rain-washings of the streets, alleys, and yards, which lick up as much as is soluble, and carry away with them even more of filthy objects, horse and cattle dung, sweepings and scrapings lying on their surfaces; refuse from hospitals, infirmaries, and dispensaries; fishmongers' and fishmarket washings and offal; slaughter-house offal; fellmongers', glue-makers', candle-makers,' bone-dealers', tanners', knackers', scum-boilers', and tripe-dressers' liquid refuse; decayed leaves and vegetables; paper and rags; refuse from chemical works, gas-works, and dye-works; branches of trees from Hampstead ditches; dead rats, dead dogs and cats, and, sad to say, dead babes.—*Builder.*

NAPHTHALINE COLORS.

BY M. PERSOZ.

Starting from the fact established by us, that a mixture of commercial nitric and sulphuric acids, even in very variable proportions, will, when heated with naphthaline, readily yield colored products, we have naturally been lead to examine the action of concentrated sulphuric acid on the various nitrogenized compounds of nahpthaline.

This is a very difficult study, however simple it may at first appear, because the least changes of the condition under which the experiment is performed, exercise a sensible influence on the results. The dye principle formed, possesses the property of madder in dyeing with mordants; its color varies from red to blue, and passes through all the shades of violet.

The blue was only obtained accidentally; and we are unable to state the precise conditions of its formation, though it appears to be due to molecular change in the nitrogenized naphthaline compound, under the influence of a physical agent.

As the violet-blue tints are the most beautiful, we have devoted most of our attention to them, and have endeavored to produce them. We soon found that binitronaphthaline, heated with sulphuric acid only, was best suited to our purpose. In his last communication to the Institute, M. Roussin, says: "By making concentrated sulphuric acid react on binitronaphthaline, no reaction takes place. The binitronaphthaline is completely dissolved when the mixture is heated to 250°, and the liquid takes hardly an amber color. After boiling for a long time, the concentrated sulphuric acid began to react on this substance." Binitronaphthaline resists the action of sulphuric acid at a very high temperature, however, at about 300°; the color of the solution, at first slightly yellow, deepens more and more, becomes cherry-red, and finally brownish-red, beginning, at the same time, to disengage a small quantity of sulphurous acid.

The substance is then taken from the fire, and left to cool when it is poured into a proper quantity of water, and boiled. The liquid, filtered whilst hot, is of a deep red color, and deposits part of the coloring matter in a flaky state. Alkalies change it to violet red; and even when cold, silk was easily dyed violet by it. After being properly saturated with alkalies, and finally with a little chalk, it dyed mordanted cotton tissues with different shades, varying from lilac to black. The lake alum, tin, and lead for a base, are violet; those with iron for a base, were olive, and sometimes reached to black.

This solution does not seem to alter even during any length of time, in presence of sulphuric acid; though, when in contact with air and excess of ammonia, it changes to brown in a few hours, depositing a black powder, which becomes blue, dissolved in alcohol, and red in acids.

The black mass proceeding from the percipitation of the sulphuric solution by water, contains a large quantity of coloring matter, has a beautiful gold reflection, is very soluble in alcohol and pyroligneous acid; but very little soluble in water, ether, benzole, and bisulphide of carbon. It has many chemical analogies with alizarine. The dyed tissues bear brightening with soap.

With binitronaphthaline and concentrated sulphuric acid only, without making use of a reducing agent, a coloring matter may be obtained with marked analogies to alizarine in its chemical properties.

VENTILATION AND ARTIFICIAL WARMING.—These are questions of vital importance in regard to dwellings, though, judging from the neglectful indifference of multitudes, their value is far from being duly appreciated by the educated, and even by some in the scientific classes of the community. Were it otherwise, the closeness perceptible on entering many of their dwellings, the oppressive heat of the rooms, the sickening fustiness in the apartments occupied by the servants, and too often in those of the children, would certainly not exist. When the number of hours passed within doors by every human being in a civilized state is considered, it will be manifest that the breathing of vitiated air for so large a portion of the twenty-four hours, must be as injurious as living on unwholesome food.—*Builder.*

REPORTS OF GAS-LIGHT COMPANIES.

PHILADELPHIA, PA.

Twenty-seventh Annual Report of the Trustees of the Philadelphia Gas-Works.

To the Select and Common Councils of the City of Philadelphia:

The trustees of the Philadelphia Gas-Works beg leave to present their Twenty-seventh Annual Report.

The loan for $125,000, passed June 3, 1841, which was created for the purpose of being issued to holders of stock in the Philadelphia Gas-Works, matured March 1, 1861, and loan No. 1, for $150,000, passed by Councils December 22, 1836, for the use of this Trust, also matured on the 1st instant; both of which have been paid out of the sinking fund.

The amount to the credit of the sinking fund on the first instant was $1,220,891 87, of which there is at present invented $1,161,349 55; all of which is in city and gas loans.

The amount of gas manufactured at the several works belonging to the Trust during the year 1861, was 632,545,600 cubic feet, being 7,033,000 less than the previous year.

The total amount of gas made under the Trust, from the commencement to the present time, is 5,512,596,000 cubic feet.

The largest consumption of gas in twenty-four hours was 3,044,000 cubic feet on the 23d of December, and is the largest for that period in the history of the Trust.

The number of public lamps on the first instant was 6,617; of which number, 5,886 are now lighted by gas.

There have been laid during the year 132,135 feet of street mains, and the entire length now belonging to the trust is 2,155,498 feet, or 408 miles.

The item of repairs continues large, which is accounted for by the necessity of relaying the pipes in the works purchased by the Trust, and from the imperfect manner in which they appear to have been laid it is a matter of some doubt whether sound economy would not justify the relaying of the mains in those sections where the loss of gas by leakage is very considerable.

As intimated in our last report, it was our intention so to do: the trustees, early in the year, purchased two lots of ground, one located in the First and the other in the Twentieth Ward. On each lot they have caused to be constructed a large and superior gas-holder, which, when completed and in full operation, will, it is believed, obviate the necessity of so great a pressure as is now required to disseminate the gas to its distant points of consumption, and thus render less frequent the cause of complaint of too much pressure from consumers residing near the place of manufacture.

For an extended notice of the Distribution Department, and the various interests committed to his charge, we refer you to the Engineer's Report, and for the financial position of the trust, with a detailed statement of its receipts and expenditures during the past year, and also a full account of the sinking fund, with a full description of the loans belonging to it, and other interests committed to his care, you are respectfully referred to the Cashier's Report (both hereunto annexed).

In conclusion, the trustees think it a subject for congratulation that amidst the prostration that has surrounded and overwhelmed so many business interests, the trust committed to their charge by Councils has continued to prosper; a result which can only be attained and preserved by ability, integrity, and economy—qualities which they believe are possessed by its chief executive officers, who have for so long a period filled the positions they now occupy.

Edward H. Trotter, President.

Attest. John P. Murta, Registrar.

Philadelphia, January 24th, 1862.

ENGINEER'S REPORT.

To the Trustees of the Philadelphia Gas-Works:

The undersigned has the honor to lay before the Board of Trustees his Twenty-sixth Annual Report of the condition of the Works confided to his care, and the results of their operations during the year just closed.

The several factories belonging to the Trust have produced, in the year 1861—632,545,600 cubic feet of gas; of which 280,219,000 cubic feet were made at the Works in First Ward, 227,681,000 in Ninth Ward, 115,080,000 in Fifteenth Ward, and 9,565,600 at the Works in the Twenty-first Ward.

The whole quantity that has been made under the Trust, from its commencement, is over fifty-five hundred and twelve millions cubic feet, or, in exact figures, 5,512,596,000 cubic feet.

The largest consumption in twenty-four hours was 3,044,000 cubic feet.

The materials used in making gas are as shown in the annexed tabular statement:

	Tons.
Coal in store, January 1st, 1861	12,920
" bought in 1861	59,486
	72,406
Coal carbonized in 1861	63,851
" on hand January 1st, 1862	8,555
	72,406
	Bushels.
Coke on hand, January 1st, 1861	78,000
" made in 1861	2,284,010
	2,362,010
Coke used under retorts in 1861	1,258,745
" used in offices, yard, and streets	44,027
" exhausters, pumps, and lime-kilns	893,181
" on hand, January 1st, 1862	39,762
	2,362,010

There have also been used 2,585 cords of wood, and 134 tons of other carbonaceous materials, chiefly resins and refuse oils, 135,798 bushels of lime in purifiers.

The maximum number of retorts continuously in use at the Works in First Ward, was 221; in Ninth Ward, 226; in Fifteenth Ward, 113; and in the Twenty-first Ward, 9. The average being, in the First Ward, 131; in the Ninth Ward, 146; in the Fifteenth Ward, 73; and in the Twenty-first Ward, 4.

The number of meters and service pipes put in at new places has been—

In the Wards comprising the Old City	403
" " Spring Garden and Penn	848
" " Moyamensing	429
" " Southwark	419
" " Richmond	94
" " Kensington	270
In the Twenty-first Ward	73
" Twenty-second Ward	86
" Twenty-third Ward	48
" Twenty-fourth Ward	159
In all	2,829

Making a total of meters and services set during the year 1861, 2,829; adding those reported last year, makes the total number of meters now in use 42,673, and 42,788 services.

The number of applications registered during the year has been—

At Seventh street office	7,041
" Spring Garden gas office	3,618
" Twenty-first Ward office	135
" Twenty-second Ward office	247
" Twenty-third Ward office	122
" Twenty-fourth Ward office	431
In all.	11,594

Deducting from these the removals and discontinuances, amounting to 8,784, and adding the number of previous consumers, shows the whole number of gas consumers at the present time on the books of the Trust to be 44,010.

The lights added during the year are as follows:

Old City	6,496
Spring Garden and Penn	11,517
Southwark	2,778
Moyamensing	2,553
Richmond	1,196
Kensington	1,777
Twenty-first Ward	780
Twenty-second Ward	1,402
Twenty-third Ward	716
Twenty-fourth Ward	1,781
Previously in use	474,961
Total	505,957

The number of public lamps now in use in the Wards supplied from these Works is 5,886.

The length of street mains laid during the year has been 132,135 feet, making the entire length of mains belonging to the Trust 2,155,498 feet, or 408 miles.

In the Manufacturing Department the new work has been limited to the completion of some extensions of office room and coal store-room at the First Ward station, some additions to the railway tracks there, and at the Ninth Ward station, with the erection of shutes at the latter for receiving coal from drop-cars, and the building of two new tanks and gas-holders on ground bought for the purpose in the First and Twentieth Wards.

The gas-holders are designed to be telescopic, but with only one section now built. When completed by the addition of the lower section, that located in the Twentieth Ward will have a capacity of one million cubic feet, and the other in the First Ward will contain six hundred thousand feet.

The line of telegraph has been extended to both these stations, and has been worked at all the offices and manufacturing stations with similar advantageous results to those reported on previous occasions.

The experiments with clay retorts have been continued through most of the year on a scale of considerable magnitude, and have again failed to yield results as economical as are obtained by iron retorts worked in our usual way.

Many of the workmen, and others employed in various departments of the Gas-Works, responded promptly to the call of the Government for volunteers in its defence against rebellion.

The names of these patriotic men were retained on the pay-rolls under the authority granted by resolution of the Board, and their families were allowed to draw for their support an amount equal to half the wages the men would have earned if on duty at the works.

Much suffering that must otherwise have been felt by the families of the absent soldiers was prevented by this timely relief.

It has considerably increased the amount of the current expenses of the year, but this outlay, as well as that incurred in organizing and partly equipping an efficient corps of Home Guard among the men remaining at their work, is fully justified by the extraordinary emergency.

Respectfully,

Jno. C. Cresson, Chief Engineer.

Philadelphia Gas-Works, 10th Jan. 1862.

REPORT OF THE CASHIER.

To the Trustees of the Philadelphia Gas-Works:

Gentlemen,—The annual accounts of the Cashier for the year 1861 are herewith presented to the Board. The general depression of business, during the past year, has been felt in its effect upon our profits, which have been further decreased by appropriations made for purposes connected with the arming and equipping of the employees of the Works, and furnishing gas, free of cost, to the volunteer force within the city limits.

The gross profits for the year amount to		$372,015 47
Which have been appropriated as follows:		
For interest on gas loans, including those payable at the City Treasury		142,724 67
For the Sinking Funds of all the gas loans		64,086 00
For eight per cent. on $450,000, the valuation of the Spring Garden, Moyamensing, West Philadelphia, and Frankfort Gas Works		36,000 00
For interest on the stock of the Southwark, Germantown, Manayunk, and Richmond Gas Works, and appropriations to their several Sinking Funds		24,209 56
For the increase of the suspended debt		3,710 56
		$270,730 79
For the net profits to be added to the Contingent Fund.		101,284 68
		$372,015 47

CASH ACCOUNT.

Dr.

Balance, January 1, 1861		$66,729 68
Receipts in 1861.		
For sales of gas, coke, tar, lime, &c., rents		1,201,963 29
" main pipe and service pipe		17,261 13
" interest on City Warrants		1,962 44
For account of the Sinking Fund:		
For interest on gas loans	$20,748 00	
" interest on city loans	17,997 50	
" city loans redeemed	7,000 00	
" sales of Loan 8	119,700 00	
" amount of Loan 3, held for this account, redeemed	38,800 00	
		204,245 50
" sales of Loan 11		244,200 00
" interest on the Sinking Funds of Germantown Gas-Works	$234 00	
Southwark and Moy'g do.	143 10	
Richmond do.	18 00	
Manayunk do.	105 00	
		500 10
		$1,736,864 14

Cr.

PAYMENTS IN 1861.

For the construction and enlargement of the Works.	$174,467 94
" the extension of the street mains	139,047 67
" service and main pipes, meters, &c	77,080 26
" coal and other materials used in the manufacture of gas, wages of workmen, charge of the public lamps, &c	554,714 80
" repairs of the Works, street mains, &c	117,733 72
" incidental expenses, salaries, &c	158,508 31
" interest on loans	50,500 62
" investments for the Sinking Fund	151,200 00
" amount paid City Treasurer for interest on Loans 9, 10, and 11, and appropriation to the Sinking Fund of Loans 10 and 11	80,144 00
" interest on and appropriation to the Sinking Fund for the redemption of $450,000 of city debt	36,000 00
" interest on gas stocks	17,829 50
" investments of the Sinking Funds of the Southwark, Germantown, Manayunk, and Richmond Gas Companies	6,703 20
" Loan 3 redeemed	125,000 00
	$1,688,930 02
Balance on hand	47,934 12
	$1,736,864 14

STATE OF THE WORKS, JANUARY 1, 1862.

ASSETS.

Works	$1,463,964 58
Street mains	1,069,686 64
Service pipes and meters	585,771 78
Public lamps	8,400 78
Cash	47,934 12
Suspended debt	23,370 06
Stocks belonging to the Sinking Fund	1,161,349 55
Coal on hand	52,185 50
Coke on hand	1,192 86
Rosin on hand	320 00
Wood on hand	2,479 50
Materials for repairs	7,000 00
Due for gas sold, delivered, and on hand	204,027 40
Due for coke, tar, &c	9,000 00
Interest on City Loans, due January 1, 1862	8,887 50
Wharf lot on the Schuylkill	6,000 00
Site of the new Gas Works	36,957 69
Spring Garden do.	300,000 00
Moyamensing do.	80,000 00
West Philadelphia do.	50,000 00
Frankford do.	20,000 00
Germantown do.	90,000 00
Richmond do.	16,500 00
Southwark & Moy'g do.	113,240 00
Manayunk do.	81,000 00
Kensington do.	90,717 79
Stocks belonging to the Sinking Funds in the hands of the City Treasurer	78,153 00
City Warrants	35,733 35
	$5,643,872 10

LIABILITIES.

Loans 1 to 11	$2,489,200 00
Dividends unpaid	405 00
Interest on Gas Loans	17,161 96
Interest on Gas Stocks	9,780 40
For coals, repairs, and materials used in the manufacture of gas	222,975 18
Sinking Fund	1,220,891 87
Sinking Fund for the redemption of $450,000 of city debt	78,153 00
Stockholders of the Southwark and Moyamensing Gas-Works, for the cost of said Works	113,240 00
Stockholders of the Manayunk Gas-Works, for the cost of said Works	81,000 00
Stockholders of the Richmond Gas-Works, for the cost of said Works	16,500 00
Stockholders of the Germantown Gas-Works, for the cost of said Works	90,000 00
Sinking Fund of Southwark and Moyamensing Gas Works	986 14
Sinking Fund of Germantown Gas-Works	782 75
Do. Manayunk do.	746 38
Do. Richmond do.	195 98
State of Pennsylvania, for State Tax on Gas Stocks.	2,080 61
City of Philadelphia, for works taken as per Ordinance of March 20, 1855	450,000 00
Profit and loss, for amount of suspended debt	23,370 06
Contingent Fund	826,402 77
	$5,643,872 10

(Statements of the Sinking Fund are omitted.)

ACCOUNT OF THE LOANS CREATED FOR THE USE OF THE WORKS, DUE AND OUTSTANDING, JAN. 1, 1862.

Loan 1.—December 22, 1836, at 6 per cent., redeemable Jan. 1, 1862	$150,000
Loan 2.—February 8, 1838, at 6 per cent., redeemable Jan. 1, 1863	200,000
Loan 4.—June 17, 1841, at 5 per cent., redeemable Jan. 1, 1866	125,000
Loan 5.—May 25, 1848, at 6 per cent., redeemable Jan. 1, 1868	70,000
Loan 6.—March 15, 1849, at 6 per cent., redeemable Jan. 1, 1869	100,000
Loan 7.—Jan. 10, 1850, at 6 per cent., redeemable Jan. 1, 1870	200,000
Loan 8.—March 20, 1851, at 6 per cent., redeemable Jan. 1, 1872	400,000
Loan 9.—July 18, 1855, at 6 per cent., redeemable July 1, 1885	500,000
Loan 10.—March 26, 1859, at 6 per cent., redeemable July 1, 1883	500,000
Loan 11.—October 22, 1860, at 6 per cent., redeemable July 1, 1884, $500,000, Issued prior to to Jan. 1, 1862	236,800
	$2,481,800

The amount of each of the foregoing loans, belonging to the sinking fund:

Loan 1	$12,200
Loan 2	58,100
Loan 4	96,800
Loan 5	36,100
Loan 6	14,100
Loan 7	66,100
Loan 8	66,400
Loan 9	177,100
Loan 10	168,700
Loan 11	151,200
	$846,800

Amount set apart and credited to the sinking fund for the redemption, at maturity, of the gas loan:

Loan 1, at	2 per cent., on	$150,000	$3,000
2,	2	200,000	4,000
4,	3	125,000	3,750
5,	4	70,000	2,800
6,	4	100,000	4,000
7,	4	200,000	8,000
8,	4	400,000	16,000
9,	2	500,000	10,000
10,	2	500,000	10,000
11,	2	500,000	10,000

The appropriation for the sinking funds of loans 10 and 11 is paid to the city treasurer, and invested by the commissioners of the sinking fund.

STATEMENT OF THE PROFIT AND LOSS ACCOUNT FOR 1861.

Jan. 1.—Amount due for coals, materials, and repairs, chargeable to the manufacture of gas			$227,927 58
Dec. 31.—Sales of gas, coke, tar, lime, &c., and rents.			1,237,698 64
Interest on City Warrants			1,962 44
Stock of coal on hand		$52,185 50	
Do. coke do.		1,192 86	
Do. rosin do.		320 00	
Do. wood do.		2,479 50	
Materials for repairs		7,000 00	
Due for coke, lime, tar, &c.		9,000 00	
			72,177 86
Due for gas			204,027 40
Suspended debt			23,370 06
			$1,767,163 98
Jan. 1.—Amount of stock on hand and debts due to the Works, at this time			$321,557 00
Dec. 31.—Payments for the manufacture of gas, coal, and other materials, and wages, including the cost of public lighting			554,714 80
Repairs of the Works, street mains, meters, and service pipes			117,733 72
Incidental charges, including wages of meter inspectors, and salaries of officers and clerks			158,508 31
Due for coals, repairs, and materials used in the manufacture of gas, and for the public lighting			222,975 18
Suspended debt, Jan. 1, 1861			19,659 50
			$1,395,148 51
Balance January 1, 1862			372,015 47
			$1,767,163 98

STATEMENT OF THE CONTINGENT FUND.

1861.	
Jan'y 1.—Amount of the Fund	$725,118 09
Dec. 31.—Increase during the year, as per the profit and loss account	101,284 68
	$826,402 77

The amount raised under various ordinances, for the construction and enlargement of the Works, for extraordinary repairs and renewals, and for working capital, has been, to January 1862—

Loans	$2,606,800 00
City of Philadelphia, for Works, per Ordinance of March 20, 1855	450,000 00
Contingent fund derived from profits	826,402 77
Stock of Germantown Gas Co	90,000 00
Do. Richmond do.	16,500 00
Do. Manayunk do.	81,000 00
Do. Southwark and Moyamensing	113,240 00
	$4,183,942 77

The amount expended has been—

Construction of Works	$1,528,624 40
Street mains	1,114,548 64
Service pipes and meters	603,032 91
Public lamps	11,814 02
Wharf lot on Schuylkill	6,000 00
Site of the Gas-Works, First Ward	36,957 69
Spring Garden Gas-Works	300,000 00
Moyamensing do.	80,000 00
West Philadelphia do.	50,000 00
Frankford do.	20,000 00
Germantown do.	90,000 00
Richmond do.	16,500 00
Southwark do.	113,240 00
Manayunk do.	81,000 00
Kensington do.	90,717 79
	$4,142,435 45

The liabilities of the Trust Jan. 1, 1862, for current business, are as follows:

Due for coals, repairs, and materials used in the manufacture of gas	$222,975 18
Due for works, street mains, service pipes and meters.	82,922 01
Due for interest and dividends	27,347 36
Due for Sinking Fund, for balance of appropriation to said fund	59,542 32
Due to the Sinking Funds of the several Gas-Works	2,711 25
Due to the State of Pennsylvania for tax on gas loans and stocks	2,080 61
	$397,578 73

The means to meet said liabilities are—

Cash on hand	$47,934 12
Debts due for gas, &c., and stock of coals and materials on hand	276,205 26
Amount of gas loan 11, unsold	255,800 00
	$579,939 38

On the first of March, 1861, loan No. 3 became due and was paid off, and the following accounts were credited with the amounts paid therefrom, when the money was originally raised by the sale of the capital stock:

Construction of the Works	$64,659 82	
Street mains	44,862 00	
Service pipes and meters	12,064 94	
Public lamps	3,413 24	
		$125,000 00

Which being deducted from the said accounts, as above stated, leaves the sum now charged therefor, on the books of the trustees.

Loan No. 1, for $150,000, was due and payable on the first instant.

Very respectfully your obedient servant,

WM. FENNELL, Cashier.

Philadelphia, Jan. 30, 1862.

1861. ENGINEER'S ACCOUNTS. 1861.

WORKS.

Wages of laborers and mechanics	$51,566 91
Iron, iron work and machinery	33,808 87
Castings	21,981 64
Stone and bricks	17,788 04
Carting, car hire and digging	9,499 84
Lumber and mill-work	8,633 53
Real estate	7,946 59
Cement, lime, sand and gravel	4,965 49
Fire brick and tile	3,459 97
Pumps and exhausters	9,633 25
Telegraph extension	2,322 59
Valves, stop-cocks, and gauges	1,643 00
Advertising, drawing, stationery, and surveying	1,345 64
Masonry and bricklaying	1,195 01
Oils, paints and chemicals	1,120 38
Hardware and instruments	1,083 41
Water-pipe, plumbing and tubing	1,055 75
Slating, roofing and plastering	982 67
Paving, grading and curbing	976 50
Tools, wheelwright and cooper work	242 86
Gum packing	216 00
	$174,467 94

STREET MAINS.

Wages of men employed in laying mains	$21,908 68
Main pipe	90,805 97
Lead	10,160 76
Paving	8,163 55
Carting	3,919 35
Castings and iron work	1,419 72
Main pipe refunded	595 17
Lumber	568 58
Ship chandlery	566 38
Fare, toll, &c	320 64
Drawing and Surveying	328 64
Tallow	114 07
Plugs	112 58
Blacksmithing	84 96
Powder and fuse	84 32
	$139,047 67

SERVICES.

Wages of men employed in laying pipe, setting and fitting up meters	$15,583 89
Meters	35,058 66
Stop cocks	9,123 76
Tubing and springs	8,776 12
Paving	3,954 40
Castings	976 44
Lead pipe	790 69
Iron	653 81
Hardware and tinware	646 01
Carting	628 99
Service and meters refunded	385 50
Lumber	313 22
White lead	95 67
Block tin	77 65
Meter barrows	10 00
Setting meters	7 50
Blacksmithing	2 95
	$77,080 26

GAS.

Wages of stokers, and men employed in retort and purifying houses, manufacturing gas, and wheeling coke, coal, &c	$128,892 23
Coal	322,992 68
Gas bought	11,829 20
Wood and other material	10,520 26
Carting	8 779 03
Oyster shells	6,599 52
Boating coal	4,729 45
Hoisting coal	2,443 35
Freight on coal	1,417 61
Splitting wood	870 89
Lime	589 10
Towing	200 00
	$494,813 32

REPAIRS.

Wages of mechanics and laborers engaged in the repair of works, street mains, and services	$26,167 54
Castings	37,309 50
Fire brick, tile and clay retorts	17,204 31
Machinery and iron work	10,822 26
Lumber, wharf timber, &c	3,995 99
Masonry and brick-work	2,483 50
Meters and repairs	2,159 54
Hardware, nails, and locksmithing	2,125 81
Iron	1,813 57
Bricks and stone	1,538 24
Oils, paints and chemicals	1,481 46
Tubing, lead pipe, &c	1,313 80
Pumps, valves and stops	1,043 52
Hose and leather	1,021 74
Bolts, rivets, and nuts	991 51
Telegraph work and instruments	874 02
Brooms, brushes, and purifier baskets	848 31
Wagons, harness, and repairs	794 44
Rope, packing, and tackle	747 60
Tinwork and plumbing	674 90
Paving	576 87
Carting	553 60
Slating	372 97
Coopering and wheelright work	339 64
Mill boards and canvas	152 09
Office furniture	105 60
Robes, blankets, and flags	96 09
Soap and tallow	76 00
Lime, sand, and cement	48 80
	$117,733 72

INCIDENTALS.

Wages	$148,826 45
Rents	12,191 81
Fluid	8,071 09
Carting	7,192 52
Lamps, lanterns and repairs	6,354 81
Printing, stationery, maps and drawings	3,912 84
Military equipments and training	3,064 83
Hay, straw, and feed	2,441 88
Horse and car hire, tolls and postage	2,543 42
Lamp posts	2,217 20
Water rent and taxes	1,899 50
Filling and trimming public lamps	1,651 25
Sundries and carriage hire for Board and Councils	1,457 93
Glycerine and alcohol	1,230 07
Paints, oils, and chemicals	1,178 72
Lamp cocks and tubing	736 15
Ground rent and interest	651 80
Shoeing and smith-work	428 11
Matches	425 76
Professional services	400 00
Boating coke	392 03
Bricks and paving	380 89
Instruments, office furniture and fuel	355 36
Subscription and advertising	245 34
Counterfeit money	113 90
Plumbing and zinc	175 35
Burners, chains, and covers	173 24
Reports of lighting	146 00
Groceries, brooms and soap	126 44
Lumber, sawing and cooper work	133 81
Mules and harness	83 75
Setting lamps	49 25
Allowance on gas-bills	79
	$209,309 79

METERS SET.

1861.	Services laid.	3 Light.	5 Light.	10 Light.	20 Light.	30 Light.	45 Light.	60 Light.	100 Light.	150 Light.	300 Light.	500 Light.	1,500 Light.	Total.
To January 1st	39,959	22,618	10,652	4,375	1,547	328	161	69	90	2	....	6	1	39,844
January	145	77	37	20	7	....	3	....	1	....	....	....	....	145
February	129	63	36	21	7	2	....	....	....	....	....	....	....	129
March	217	127	46	32	10	2	....	....	....	....	....	....	....	217
April	255	135	78	36	5	1	....	....	....	....	....	....	....	255
May	217	132	47	24	13	....	1	....	....	....	....	....	....	217
June	181	116	30	19	14	1	1	....	....	....	....	....	....	181
July	180	105	39	22	13	1	....	....	....	....	....	....	....	180
August	245	133	59	31	22	....	....	....	....	....	....	....	....	245
September	310	170	61	37	35	2	2	2	1	....	....	....	....	310
October	385	210	75	68	26	3	1	1	....	....	1	....	....	385
November	328	195	60	50	14	2	3	2	1	....	1	....	....	328
December	237	158	31	32	8	3	4	....	1	....	....	....	....	237
Total	2,829	1,621	599	392	174	17	15	5	4	....	2	....	....	2,829
Brought down	39,959	22,618	10,652	4,375	1,547	328	161	69	90	2	....	6	1	39,844
Grand total	42,788	24,239	11,251	4,767	1,721	340	176	74	94	2	2	6	1	42,673

MAIN PIPES LAID IN STREETS.

1861.	1½ inch.	2 inch.	3 inch.	4 inch.	6 inch.	8 inch.	10 inch.	12 inch.	16 inch.	18 inch.	20 inch.	Total.
To January 1st	3,946	182,236	891,208	603,202	178,265	85,796	20,094	24,346	11,183	....	23,137	2,023,363
January	....	....	....	....	....	....	....	....	....	....	....	.....
February	....	84	341	144	....	....	....	....	....	....	....	569
March	....	1,314	9,663	4,485	331	4	....	....	....	....	....	15,797
April	....	3,756	16,608	6,198	....	....	....	....	....	....	....	26,562
May	....	5,288	13,261	6,554	8	....	....	....	....	....	....	25,106
June	....	3,088	5,905	882	....	....	....	....	....	....	....	9,875
July	....	480	1 298	255	....	....	....	2,898	6,624	....	....	11,555
August	....	786	8,639	941	....	....	....	3,221	....	....	....	13,587
September	....	624	6,518	6,302	214	....	....	....	2,285	....	740	16,683
October	....	84	1,407	723	540	....	....	....	2,929	....	....	5,683
November	347	442	1,185	614	....	458	....	....	1,619	....	....	4,665
December	....	444	750	1,096	....	....	....	....	13	18	282	2,583
Total	347	16,385	65,575	27,694	1,093	462	....	6,119	13,470	18	972	132,135
Brought down	3,946	182,236	891,208	603,202	178,265	85,796	20,094	24,346	11,183	....	23,137	2,023,363
Grand total	4,293	198,621	956,783	630,896	179,358	86,258	20,094	30,465	24,603	18	24,109	2,155,498

CITY REGISTRY.

1861.	Applications.	Removals and discontinuances.	Private Lights. Added	Private Lights. Total.	Public Lights. Str'ts.	Public Lights. Ma'k't H'ses.	Public Lights. Sq'res.
To January 1st	96,578	55,378	290,486	474,961	5,345	116	140
January	563	458	1.925	476,886	....	....	....
February	603	467	1,168	478,054	....	....	....
March	857	642	2,316	480,370	19	....	....
April	953	685	2,663	483,033	149	....	....
May	819	620	2,354	485,387	32	....	....
June	894	706	1,986	487,373	20	....	....
July	818	629	1,856	489,229	2	....	....
August	991	753	2,038	491,267	12	3	....
September	1,336	1,004	3.207	494,474	14	1	....
October	1,603	1,222	4 441	498,915	24	....	....
November	1.204	901	4,122	503,037	37	....	....
December	953	697	2,920	505,957	89	....	....
Totals	11,594	8,784	30,996		398	4	....
Brought down	96,578	55,378	290,486		5,345	116	140
Grand totals	108,172	64,162	321,482	505,957	5,743	120	140

REPAIRS OF SERVICES, &c.

1861.	Services Renewed.	Stop Cocks Renewed.	Stop Cock Boxes Renewed.	Rims and Covers Renewed.
January	..	..	10	2
February	..	..	19	9
March	..	..	11	7
April	..	..	454	3
May	1	2	668	71
June	1	3	855	55
July	6	6	962	48
August	..	..	738	48
September	3	3	410	29
October	5	5	169	32
November	2	3	130	18
December	1	2	55	13
Total	19	24	4,481	335

STATEMENT OF GAS

Paid for in each month of the year, made at all the Works managed under the Trust, being the amount of bills, as per meters, to the first of the month.

1861.	Private Houses.	Public Lamps.	Totals.
January	52,761,700	.....	52,761,700
February	45,866,700	.....	45,866,700
March	58,151,700	.....	58,151,700
April	47,014,100	.....	47,014,100
May	30,655,700	.....	30,655,700
June	39,821,400	.....	39,821,400
July	26,460,700	.....	26 469,700
August	16,080,900	.....	16,080,900
September	22,057,300	.....	22,057,300
October	24,510,300	.....	24,510,300
November	25,376,800	.....	25,376,800
December	48,649,400	134,372,343	183,021,743
Total	436,907,200	134,372,343	571,279,543
Inventory of stock of gas delivered and on hand: January 1st, 1862		103,584,900	
January 1st, 1861		102,815,000	719,900
			571,999,443

STATEMENT

Of Gas made at all the Works manrged under the Trust, and of that delivered to public and private lights to December 31st, 1861.

Year.	Made at Works in 1st, 9th, 15th and 21st Wards	Public Lights.	Private Lights	Used at the Works, Offices of the Trust, Loss by Leakage, &c.
1859	562,110,000	98,900,345	395,228,000	67,981 655
1860	689,578,900	119,994 818	459.152,800	60,430,382
1861	682,545,600	134,372,343	437,627,100	60,546,157
	1,834,233,600	353,267,506	1,292,007,900	188,958,194
Made in previous years	3,678,362,400			
Total	5,512,596,000			

NUMBER

Of Lamps under the care of the Department of Public Lighting, January 1st, 1862.

	Gas.	Fluid.
* City—including Moyamensing, Southwark, West Philadelphia, Spring Garden, Kensington, Richmond, Germantown, Manayunk, Frankford, and Nicetown	5,886	293
† Northern Liberties	408	30
	6,294	323
	323	
Total number	6,617	

* Supplied directly from City Works.

† Supplied from Northern Liberty Gas Works.

BOARD OF TRUSTEES OF THE PHILADELPHIA GAS-WORKS FOR 1862.

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WILLIAM ROTCH WISTER.

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Engineer.

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Appointed Aug. 26th, 1836.

Cashier,

WILLIAM FENNELL,
Appointed April 10th, 1857.

Registrar,

JOHN P. MURTA,
Appointed April 10th, 1857.

GAS-HOLDERS.

With reference to the shape of gas-holders, those deserve the preference which hold the most gas with the least expenditure of material (sheet iron). A cylinder, the radius and height of which are equal, is, therefore, best suited to this purpose (other shapes are not applicable); a foot, however, is added to the height that the margin may always be under water. The capacity, and consequently the diameter, or the height of the gas-holder must depend on the demand for gas. If the cylinder at its extreme height is to contain q cubic feet of gas, then it follows from $3.14\ r^2\ h = q$ first $3.14\ r^2 = q$ (because $r = h$), and hence $r^2 \sqrt[3]{\frac{q}{3.14}}$. The operation of the whole machine is easily understood. On filling the gas-holder, the exit tube is closed, and the gas flowing in through the proper conduit, raises it, its weight being borne by the weights. Besides, the weight of the cylinder and that of the gas together is much less than the weight of an equal volume of water. A gas-holder 40 feet in diameter (and consequently 21 feet high) when at its greatest height, weighs, gas and iron together, about 123 cwt., whilst an equal volume of water would weigh 7,800 cwt. As soon as the drum is filled up to the height of its radius the entrance pipe is closed, and the connection between the gas-holder and the furnace is thus cut off. The next object is to cause the cylinder to sink in such a manner that the gas shall flow out with that degree of force which experience has shown to be desirable, and which corresponds with the pressure of a column of water from one to two inches high; the water on the outside must, therefore, stand from one to two inches higher than on the inside. This state of things is brought about by connecting a bent tube containing water (or manometer) with the exit pipe, and by altering the counterpoise until the water in the manometer has risen from one to two inches. From obvious reasons, however, this pressure would not long remain the same; for by dipping lower into the water of the cistern, the drum loses more and more of its weight, and, moreover, just as much as the weight of the water displaced by the edge. The same, therefore, happens as would result from a gradual increase of the weight of the counterpoise—the pressure is diminished. With a drum of the above dimensions, the cubic space occupied by 10 feet of the margin would be nearly 30 cubic feet, which, therefore, displace 30 cubic feet = 927 lbs. of water, and the pressure is diminished 1-6th inch. This diminution may be counteracted by the chain, if it has been constructed of the proper weight. In every position of the chain, one portion on the side of the counterpoise will balance another portion on the other side of the pulleys—the lower the drum sinks, the more of the chain passes to its side of the pulley; each link, however, is a weight taken from the counterpoise and added to that of the cylinder, so that this is increased in weight by twice the weight of the chain which has passed the pulley. The weight of the chain must, therefore, be such, that the portion passing the pulley weighs just half as much as the water which is displaced at the same time. In addition to this, it is obvious that the specific gravity of the gas must have an effect upon the working of the gas-holder. Oil gas has nearly the same density as the air, and the weight of the enclosed gas is, therefore, not sensibly different from an equal volume of air; it will, consequently, be in equilibrium with the external air. This is not the case with coal and resin gas, which is 1 2-3 times lighter. The portion already above the water will stand in the same relation to the surrounding air, as the portion still immersed stands to the surrounding water; it will endeavor to rise, although with less force. In other words, the part above the water is in the condition of an air balloon, the enclosed gas being lighter than the same number of cubic feet (which it displaces). If this difference in the gravities were greater than the weight of the iron composing the vessel, then the gas-holder would rise; under existing circumstances, its tendency to rise merely diminishes its weight. A cylinder 40 feet in diameter, and 20 feet at its highest stand, contains 25,231 cubic feet of coal gas; the same number of cubic feet of air will weigh 1,020 lbs., whilst the gas will only weigh 662 lbs. In this position, therefore, the external pressure of the air will diminish the weight of the gas-holder 358 lbs., and this must be taken into calculation in regulating the chain. The tendency to rise in the gas-holder increases as it fills or rises, but at the same time its loss of weight by submersion in water diminishes. Further, the tendency of the cylinder to rise increases with its capacity and dimensions, the loss of weight on the contrary with its amount of surface, therefore, in diminished proportion, so that, with a certain diameter, these two compensate each other, or the pressure may even diminish as the cylinder sinks.—*Knapp's Technology.*

THE LIME LIGHT AT THE SOUTH FORELAND, ENGLAND, LIGHTHOUSE.

On page 133 of this volume we published a statement of the operation of the lime light at the South Foreland Lighthouse. We find the following account in the *Journal of the Board of Arts for Upper Canada*, which gives some interesting details of the manner of using the light:

Five and thirty years ago Lieutenant Drummond brought into notice the oxyhydrogen light, and applied it to a practical purpose. Having been appointed to conduct the Ordnance survey in Scotland and Ireland, he used this light in focus of a parabolic reflector on lofty eminences, where the stations were usually placed, as it was of the greatest importance in those operations to have certain and determinate signals, which could be seen, under any circumstances as to weather, at great distances. Thus he succeeded in connecting the shores in England and Ireland, near Holyhead, a distance of 65 miles, and afterwards, in Scotland, the summit of Ben Lomond with that of Knock Layd, no less than 95 miles apart. It did not escape the comprehensive mind of Drummond to perceive that such a light, if capable of practical application, would be invaluable for lighthouse purposes. With the means he devised, however, he failed to obtain anything approaching practical command over the continuity of the light; and as a light that is liable to go out is inadmissible, for lighthouse purposes, it is not surprising that it was condemned.

Since Drummond's time, until quite recently, the oxyhydrogen, or lime light, has been used only for the purposes of the microscope, or to produce scenic effects; not that the value of a light of such power and intensity has been lost sight of, but because all attempts to render it practically available in a commercial sense had failed.

The impossibility of turning it to a useful purpose, seems to have so taken possession of the public mind, scientific as well as general, that although within the last two or three years, exhibition after exhibition, varying in duration from hours to months, have given the most incontestable proofs that with Bartable's apparatus the lime light can be burned as easily and certainly as a wax candle, yet, with a single but notable exception, not one eminent man of science has been found who has not scouted the idea of its practical utility. Upon almost every occasion of late when our men of science have condescended to mention the lime light, it has been condemned by them as impracticable, and the idea of its applicability to any useful purposes contemptuously dismissed; whilst the assumption that it can be used for ordinary domestic purposes has met with most positive contradiction, interspersed, upon one or two occasions, with assertions as to the available sources and expense of oxygen gas, which, although valueless in themselves, are useful as indicating the amount and accuracy of information upon the subject possessed by some of those who have pronounced the severest condemnations of it. It has been the fashion in scientific circles to condemn the lime light, and there are few amongst those who have not compromised themselves more or less by decrying it; and experience will have taught us that from such we can expect but a tardy recognition of even a fact that is subversive of a long cherished dogma. This prejudice, which has seriously impeded the general introduction of the lime light, is traceable to its usual source—want of accurate information on the subject; for although the means were at hand, not one of those who ridiculed the idea that the lime light had been brought to a state of perfection, rendering its practical application to illuminating purposes easy and certain, took any trouble to make such an investigation as to the alleged fact as could justify the expression of any opinion at all. The public at large took the view of the *savans*, whose opinions were readily adopted and disseminated by those who are interested in the continuance of the present methods of producing artificial light; whilst the verdict of gas engineers, scientific advisers to gas companies, and other vested interests, upon the lime light was such as a notorious poacher might expect at the hands of a jury composed of cock-pheasants.

In the meantime, however, whilst the learned condemn it, and capital fought shy of it, the light went on burning steadily—carefully watched, examined, and, in course of time, appreciated by one, at whose hands truth never suffers, imposture is never spared, and whose opinions are ever formed for himself by patient and careful investigation, and not expressed until all doubt has been removed. Without having been made aware of the exact conclusions arrived at by this investigation, it must be supposed to have been favorable, as it led to a decision on the part of the Trinity Board to give the light a fair trial in a first order lighthouse, for which its peculiar qualities are preëminently fitted. To this end a contract was entered into with the Universal Lime Light Company by the Elder Brethern for the exhibition of the light in the South Foreland Lighthouse for three months, and upon its success will in all probability depend its extensive adoption for the purposes of coast lighting. The light was introduced on the 26th of August, and has continued to burn steadily and brilliantly every night since its substitution for the oil light. Indeed, after the report of Mr. Page, the engineer of Westminster bridge, upon the success of the lime light which for two months illuminated the finished part of that structure, no doubt can exist as to the facility with which it can be maintained, for no case of failure occurred there in maintaining regularly eighteen lights in nine different lamps where the operation of making the gases had to be conducted upon temporary platforms, suspended between wind and water, and the whole arrangements, necessarily of an incomplete and temporary character, added very largely to the ordinary risk of a failure occurring. The lamp at the South Foreland is fitted with eight burners, to meet the requirements of the Fresnel apparatus, which is composed of eight panels; only six out of the eight burners, however, are required, as the two panels towards the land are darkened. The manipulation of the lamp is perfectly simple, not necessitating an amount of intelligence greater than is required in the case of an ordinary Argand lamp. When the time for lighting comes, the lime wicks are inserted, the clock which moves them wound up, and the gases turned on, and no further attention is required until the hour arrives for putting out the light, when the gases are turned off, and the clock is stopped; the lime wicks are then removed, and nothing further remains to be done. The brilliancy of the light has not escaped the notice of our friends on the other side of the Channel, many of whom have been over to visit it. It is but fair to state that the present apparatus in which the lamp is exhibited is not calculated to give the maximum effect, having been especially adjusted for the usual Argand oil lamp, which differs from the lime light in the essential particular of focal distance, which is measured from the centre of the former, but from the surface of the latter; the lime light, therefore, although of the same diameter as the oil flame, is too near the lenses by half its diameter—in this case by $1\frac{1}{4}$ inches. It is to be hoped that this light will be tried both in a French apparatus, specially adjusted, and in the focus of a paraboloid, for it appears to possess every element, rendering it by far the best light for coast purposes ever introduced.

Amongst other attributes of the lime light is another of the very last importance. It is not affected by wind, even though unprotected by glass. At Liverpool, where the lime light was exhibited for two months upon the landing stage where the Birkenhead ferry-boats ply, this property was most severely tested. One night a gale of wind came on, and increased in violence until the glasses of the lanterns were dashed in, and the light was exposed to its full power. No apparent effect was produced upon them, for they continued to burn as steadily and brightly as before. It has happened not so unfrequently as might be imagined, that the glass of our lighthouses has been broken in violent gales, and the light blown out.

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PROPRIETOR, JOHN B. MURRAY. | EDITOR, C. ELTON BUCK.

TUESDAY, APRIL 1, 1862.

In the production of illuminating gas, no single part of the manufacture is of more importance than the change which takes place in the crude gas in the purifying house, fitting it for harmless consumption. We may even go further than this, and say that no other part of the process of gas-making is worthy of as much minute attention and care, as that exerted in effecting the removal from it of all its deleterious ingredients. Gas may be feeble in its illuminating power—its price may be exorbitant, and still consumers will be found ready to put up with these objections. But let it once be credibly asserted that poisonous or injurious substances are generated in appreciable quantities, and loud remonstrances would be made, and consumers, fearing the effects of this state of affairs, would soon look around for other means of artificial illumination, which engender no such products. Hence it is, that ever since the introduction of coal-gas, great attention has been paid to effect its purification, and the paramount importance of this branch of the process has elicited the consideration of gas-engineers from the infancy of the art.

The principal impurities of coal-gas consist of ammonia, carbonic acid, and sulphuretted hydrogen, together with very small proportions of bisulphide of carbon and compounds of cyanogen. According to Mr. LEWIS THOMPSON, the author of the *Chemistry of Gas-Lighting*, gas made from common Newcastle coal contains in 1,000 parts, 1½ parts of ammonia, 8 parts of sulphuretted hydrogen, and 25 parts of carbonic acid. Although these proportions when reduced to the amount per cent. may seem very small, yet the gas if delivered to consumers containing such a ratio of foreign matter would soon produce complaint, and the most unsparing denunciations of companies would follow. Even after the greater part, if not all, of these impurities have been removed, we find croakers who diligently represent that coal-gas is still an unfit illuminating agent for certain purposes, and who aver that "oil of vitriol" and other impossible substances are evolved by its combustion. Alarmists of this character are hardly worthy of a passing word, and yet they exert more influence upon the public mind than might be supposed.

As we have above stated, the three principal ingredients, existing in all crude gas, and which it is necessary to have removed, are ammonia, carbonic acid, and sulphuretted hydrogen; and it is with a special view to the abstraction of these compounds that all methods of making a pure gas have been directed. Mr. WINSOR, whose connection with the early history of gas-lighting presents so many curious aspects, appears to have been the first person who applied lime for the purpose of purifiying gas. The substance first employed continues to be held in higher estimation than any other agent, and notwithstanding the numerous other materials which have been proposed for this purpose, lime still retains the ascendancy, and, all things being considered, is more economical in its application and more effective in its operation than any other compound. In this respect, the adherence to the use of lime, the first substance proposed, bears an analogy to certain other processes in the industrial arts, where the material originally adapted to a particular purpose, still continues to be employed, notwithstanding the attempts made to fix upon a substitute. The claims of lime are many, and in addition to its efficacy in detatching the impurities previously named, its cheapness and the ease of handling it are strong arguments in its favor. In this country it is alone used in purifiers, for as far as our knowledge extends, no other substances are used in conjunction with it. In some cities of England, however, where the use of lime as an absorbent of sulphuretted hydrogen has been rendered impracticable for reasons of a sanitary nature, other substances have been resorted to, and the ingenuity of chemists and engineers has been taxed to the utmost, in claiming the use of many salts and other compounds. We have frequently noticed the number of English patents referring to the purification of gas, and have drawn attention to the fact of the close resemblance which several of the more important ones bear to each other—some of them being, to all outward appearance, almost counterparts of previous inventions. The reports of the interminable litigations which these patent processes have occasioned in the English courts would fill volumes. They have been quite a windfall to the solicitors who advocated the claims of their respective clients, and have occupied the attention of judges, whose opinions have been delivered with great care, and some of them will stand as precedents for future reference in similar trials. In these opinions the nice distinctions which are drawn between apparently similar objects, and the skillful line of argument used to sustain these views, elicit unqualified admiration from experts in patent law; and although they may at first seem incomprehensible, and difficult of solution, the masterly manner in which they have been drawn, and the main points sustained, have received the encomiums of even those whose interest would prompt a contrary belief.

One of these cases has recently terminated in London, where it has excited no little attention and interest among gas engineers and scientific men generally. We refer to the case of HILL *v.* EVANS, which has been tried in the Court of Chancery. In order to fairly understand the merits of this case, it will be necessary to glance at various inventions for purifying gas; for the whole matter at issue consisted of the clashing rights of claimants to the oxides of iron as a purifying agent.

In 1806, EDWARD HEARD took out a patent for purifying gas by means of lime, but while chiefly relying on this substance, construed his specifications so as to include the oxides of iron and other bodies. The question whether oxide of iron as a purifiying agent was first proposed in England or France, is an open one, and some uncertainty exists in regard to it. This is of itself an unimportant matter. The first person in England who applied this material was Mr. PHILLIPS, of Exeter. This gentleman preferred to use the oxide in a wet purifier. Shortly after this Mr. CROLL secured to himself by patent the use of "the oxides of iron in a dry lime purifier." The searching eyes of Mr. LAMING observing an entrance for him in this field of monopoly, he also took out a patent. This gentleman "patented the joint ideas of PHILLIPS and CROLL with the addition of muriate of lime, so as, in effect, to remove not only the sulphureetd hydrogen, but also the ammonia at the same time and if necessary by the same apparatus." Following up the records of the British Patent Office, the next person in order claiming the use of oxide of iron, is Mr. HILLS, who in his specification claims the use of "the hydrated and precipitated sesqui oxide of iron for purifying gas," in a dry lime purifier. Mr. LAMING again appears before the public in a patent for the use of oxide of iron under date of November 4th, 1847, in which carbonate of iron, oxide of iron, and chloride of calcium are all prescribed, and the benefits resulting from their use detailed at greater length than we have either the inclination or space to notice. Shortly after this, in November, 1849, Mr. HILLS secured another patent, in which he claims the revivification of oxide of iron after it has become inert, by exposing it to the influence of the atmosphere, when the sulphuret of iron becomes converted into oxide again and may be repeatedly used. Although Mr. HILLS secured this process in his patent, it had been previously practised by Mr. EVANS. Mr. HILLS' patent lays particular claim to the hydrated, or precipitated oxide of iron, while shortly following him, Mr. LOWE and Mr. EVANS patent the use of anhydrous oxide of iron. Thus, it will be seen from this brief statement of the principal claimants of the use of oxide of iron as a purifying agent, on how exceedingly narrow a basis each individual patent must stand, and still preserve its own distinctive features. To the mere passing observer, there would appear to be very little difference between any of them, but to the experienced eye of an expert skilled in patent law, each specification has its characteristic features which serve to distinguish it from the rest. It is not our purpose, however, to dwell on these points, but to revert to the decision lately arrived at by the Lord Chancellor in the case we have just mentioned. The virtual question decided, was the validity of Mr. HILLS' patent. The case, according to *Newton's London Journal of Arts*, originally came up in 1856, and by different judges has been decided both in favor of plaintiff and defendant, from which decisions appeals have been carried by each of the litigants. The final hearing was commenced in the Court of Chancery, January 16th, 1862, the arguments occupying five days. On January 29th, the Lord Chancellor delivered his opinion confirming the validity of HILLS' patent. The Lord Chancellor, in his opinion, thus speaks of the right of Mr. CROLL:

"* * * * in the course of his description Mr. Croll says, that the third part of his invention consists in the application of the black oxide of manganese; and the mode described, after it has first answered the purpose, is to renew it and to restore its purifying powers by roasting it in an oven, to expel the sulphur which it has contracted or taken up in the course of the purification; and, after describing the mode of treating the chief substance to which he directs the attention of the public, he proceeds, at a later part of his patent, to say that the same effect may be produced by the applicatian of the oxide of zinc and the oxides of iron, heated precisely in the same way as above described. This, therefore, is a proposition that the oxides of iron—that is, all the oxides of iron—may be applied in a manner that will admit of the same effect being produced. Now, it is an admitted fact, that the proposition is untrue. It is a clear result, therefore, that the proposition would only mislead the individuals who relied upon it. If he took some of the native oxides of iron, or if he took the anhydrous oxide of iron, it is an established fact that they would not answer the purpose. This amount, therefore, of general proposition, is not true in the extent in which it is expressed, and it requires further invention and discovery to modify and restrain it within true limits, so as to admit of its becoming a rule of practical and useful application. In the latter part of Croll's specification, he states that he claims 'the purification of coal-gas from ammonia, and the purification of gas from the sulphuretted hydrogen, by means of the oxide of manganese and oxides of iron and the oxide of zinc, as hereinafter described.' It is quite clear, therefore, that he claims the oxides generally; and, if you are to infer anything from what he states with regard to the manner in which they are

to be applied, you would infer this conclusion—that they are to be applied in an anhydrous and not in a hydrated state. Now, I apprehend that that has added nothing to human knowledge which has superseded, or rendered unnecessary the practical invention of the plaintiff; and I pass from that to the last specification, which is the specification of Laming."

From the above extract it will be seen that Mr. CROLL, in his grasping desire to secure more than he really knew anything about, inserted claims of a general nature, relating to several agents, some of which are entirely useless for the purpose for which they were designed. In other words, there are in Mr. CROLL's patent no distinct directions as to what is meant by oxides of iron, or in what manner they are to be used. The terms he employs are vague and indefinite, and totally unlike the specification of Mr. HILLS, which describes the particular kind of oxide with precision, and thus specifically indicates the nature of his invention. After mentioning his objections to the claims of Mr. LAMING as conflicting with those of Mr. HILLS, the Lord Chancellor thus refers to the contrast between the previous patents and that of the latter gentleman:

"* * * * I have arrived at this conclusion, after carefully examining the learned arguments that were advanced to me,—that there is nothing in either of these three specifications which in the smallest degree forestalls, anticipates, or rendered unnecessary the plaintiff's invention, or gave to the public that peculiar benefit which they have derived from the discovery of the plaintiff. * * * * I cannot find in any one of those patents a clear, distinct, and definite indication of the admittedly beneficial discovery that was afterwards made by the plaintiff. * * * * The last subject of argument before me turned upon this,—whether the plaintiff's specification was itself open to a similar objection, namely, in using words in a sense too general for the actual truth—that is to say, in describing the agent which he employed under words that would cover substances not capable of being usefully employed; and the particular words in the plaintiff's specification are, that he makes use of hydrated or precipitated oxides; and it is said that 'precipitated' is there opposed to 'hydrated;' that there are some hydrated oxides which would not answer the purpose; and that, therefore, the plaintiff's specification is bad, for too great generality and for inaccuracy. But, upon examination of that specification, my opinion is, taking the whole of it together, that the only hydrated oxides (granting that that word is to be opposed to 'precipitated,' and disjoined from it) described by the plaintiff, are the artificial hydrated oxides; and it is not pretended that there is any artificial hydrated oxide which will not answer the purpose. An objection was raised in the Court of Exchequer, by treating the word 'precipitated' as narrowing, and correcting the generality of the word 'hydrated.' I prefer, rather, to rest upon the explanation that I have given, namely, that if the word 'hydrated' be taken by itself, and be considered as including more than the precipitated oxides, it must still be confined to those hydrated oxides which are artificial; and there is no proof or suggestion that there is any known artificial oxide that will not answer the purpose. Upon every ground, therefore, I arrive at the conclusion that the plaintiff's specification is good, and, consequently, the plaintiff's patent must be held to have been conclusively established at law. * * *"

From these extracts the status of the respective patentees is clearly pointed out, and the comparative value of their claims lucidly shown. There are many patentees in mechanical as well as chemical inventions, who, after stating the primary object of their discovery, cast their eyes about them and tax their ingenuity in order to discern whether various objects can by any possibility be suspected of accomplishing what they already know other substances will. In this manner, exhibiting a fertility of imagination rather than of inventive genius, they contrive to name in a general way more substances than they are really acquainted with, in the hope of wholly excluding other experimenters from the field which they desire to monopolize. A few cases such as the one just cited, and the JAMES YOUNG coal-oil patent, are sufficient to show that all the "glittering generalities" in the world are not worth as much as a plain, concise statement, narrated in such a manner as to instruct how to follow a process rather than mystify and mislead. We have consumed more than our usual space in the discussion of this case, but the decision will form a precedent of no small significance in patent law; and, as bearing upon the history of inventions connected with the manufacture of gas, we hope it will interest a portion, at least, of our numerous readers.

MORE CROAKING.—Illuminated gas is never pure. It always contains bisulphide of carbon, and occasionally sulphuretted hydrogen. Both these agents are combustible, and when burned yield fearful contaminations. The first result is a gas called sulphurous acid: the very same that is evolved from burning sulphur, and it speedily changes into oil of vitriol. The results of gas combustion are not harmless, because invisible; rather the reverse. Were they like smoke, visible, then the most incautions would guard against them. The products of gas combustion should always be conveyed away by a chimney terminating in an inverted funnel.—*Scientific Amer.*

Our neighbor of the "Scientific" has discovered a wonderful mare's nest. We would like to examine some of the "illuminated" gas which yields such "fearful contaminations." It is very well known that a small quantity of bisulphide of carbon is consumed during the combustion of coal-gas, but this compound exists in such minute quantities as to give no ground of alarm. As for the statement that "oil of vitriol" is produced from burning gas, it is simply absurd.

ANSWERS TO CORRESPONDENTS.

J. G. T., of Me.—*Not having heard the report you allude to prior to your letter, we are at a loss to account for it. Possibly your informant may have been mistaken. It is very surprising if true.*

B. E. D., of Cal.—*Clay retorts exclusively, are used at the Manhattan Gas-Works of this city, as well as at most other well regulated establishments.*

D. J., of Pa.—*We cannot give an opinion such as you ask, without making a personal examination, and visiting the locality of your operations.*

P. J. P., of Md.—*The rule is thus expressed in Hughes' Treatise on Gas-Works,—"Multiply the quantity of gas delivered under the pressure of any known depth of water, by the square root of the depth for which the quantity is required, and divide the product by the square root of the depth for which the quantity is known, the quotient will be the quantity delivered under the required pressure." You will find much information on this subject in the 17th Chapter of Hughes' work.*

M. T., of Mass.—*The claims of Murdoch and Le Bon are urged with equal positiveness by English and French writers, respectively—each author assigning the honor to his own countryman. We are inclined to believe the honor really due to Murdoch, who certainly first demonstrated to the public, the practical benefits of gas-lighting.*

L. J. F., of Wis.—*Hemp seed oil is produced from Indian hemp* (cannabis sativa). *The seeds of this plant yield sometimes as much as 35 per cent. of oil. It has a disagreeable odor, and is not much used for illuminating purposes, except by the lower castes in India. We believe by proper chemical process the odor may be removed.*

E. S. C., of N. Y.—*A burner somewhat similar to the one you describe, was invented some time ago in England, by Messrs. Baldwin and Neal, who called it a pinnacle burner. The constructon of the chimney, in particular, resembled yours.*

O. W. D., of Ohio.—*We advise you to give no heed to those senseless agitators who are continually decrying the gas-meter, and alleging it to be always wrong—never were more wilful perversions of facts stated—of course some meters may be unreliable, and register against the consumer; but the error is just as likely to be against the company. The charge that companies intentionally over-fill meters, is simply absurd, and about as credible as that your grocer intentionally makes indentations in his quart and pint measures, to reduce their size, or employs light weights. There are doubtless mischief makers at work in your vicinity, but we hope their foolish statements will be received with all due allowance.*

B. W. S., of Ind.—*According to the experiments of Dr. Henry, olefient gas and carbonic oxide, are of the same specific gravity. One cubic foot of these gases, weighs 250 grains.*

WHITE PLAINS, N. Y.—These gas-works have been sold out, as we are told, by the sheriff, to Mr. Wm. H. Gywnne, for about $2,500, and they are to be immediately changed into water-gas works, under Gywnne's process, when we may get something reliable on the subject of water-gas. We hear nothing further on the subject from either Philadelphia, Pa., Aurora, Ind., or Marlboro', Mass.

THE PETROLEUM REGION OF PENNSYLVANIA.

The oil district is peculiar in many respects. The far-famed Oil Creek ordinarily is a stream of about one hundred feet wide, and three feet deep. It flows for seventeen miles in a southerly direction, from Titusville to Oil City, when it falls into the Allegheny river. It winds through a narrow valley, about half a mile wide, with hills rising from seventy to one hundred feet high on each side. The wells are bored in the level meadows, or bottoms, forming the dry links on each side of the creek, and they extend through the whole valley. The pumping wells have been bored to a moderate depth; the flowing wells are bored from three hundred and fifty to over five hundred feet in depth. Oil City, McClintockville, Rouseville, and Titusville, are important oil villages, situated in the valley. The flowing wells vary in their productions, from fifty up to five hundred barrels per day, the amount in gallons from one well being not less than twenty thousand per diem. There is no evidence of the supply being exhausted, as the oldest flowing wells yield as abundant to-day as when first opened, and, excepting in a single instance, the flow of none has been affected by new wells sunk within a short distance.

The petroleum, although coming up from a depth, is piercing cold, and in this respect, it differs from the water of artesian wells, which is generally quite warm. The virtues of petroleum are not confined to giving light. The people in the oil regions value it highly as a panacea for almost all the ills that flesh is heir to. Its virtues have been widely extolled as a rubefacient, and by some it is used internally, for various disorders, over which it is reputed to hold no inconsiderable power. The coal oil business has been extinguished by the petroleum wells. A ton of coal, costing two dollars at the mines, and ten or twelve in New York, and other eastern cities, made fifty gallons of oil, whereas one well, at least, delivers twenty thousand gallons, equal to the product of four hundred tons of coal, without the expense of distillation.

BROOKLYN, N. Y.—At the regular meeting of the Common Council of Brooklyn, held on the 17th ult., a communication was received from the Mayor relating to the street lamps. In this communication it was said that the lighting of the streets, should the present system (keeping the lights burning all night) be continued, will require an extra outlay of not less than $40,000 more than the amount raised for that purpose the current fiscal year. The estimate of this item of expenditure, the Mayor says, was based upon the amounts expended in former year. The increase in the number of lamps, but more especially in the number of hours they are allowed to burn, has already made a difference in cost for the first two months of this year, as compared with the same period of last year, of over $13,000—the amount expended for January and February, 1861, being $18,013 55, and for the corresponding months of this year, $31,474 16. The lamp and gas account has always had a surplus until the change in the hours of lighting was made last year, when not only did the whole amount to the credit of the account become exhausted, but transfers had to be resorted to to balance the same. The Mayor makes no recommendation, but concludes by saying that "the further delaying of this matter will, in my opinion, cause great embarrassment before the expiration of the year." This subject was referred to the Lamp and Gas Committee.

THE STERLING COAL.—Messrs. F. Butts & Co. have lately supplied the following gas companies with their excellent coal: Albany, N. Y., Cohoes, N. Y., Hudson, N. Y., Schenectady, N. Y., Troy, N. Y., West Troy, N. Y., and others in eight different states.

PHILADELPHIA, PA.—A resolution was passed on Thursday by the City Councils of Philadelphia, directing a cessation of the supply of the Delaware water to the old District of Kensington. The water will be drawn from the Spring Garden Works until the Delaware Works can be overhauled. On page 100 of this volume, we published the correspondence between some citizens of the old Kensington district and the Board of Health, in reference to the bad quality of the water furnished by the Delaware Works.

ON A SAFETY-LAMP FOR LABORATORY USE.

By C. M. Warren.

The danger attending the distillation of highly inflammable liquids, in glass retorts, over an open flame,—and other manipulations of similar nature,—as commonly practiced in laboratories, has probably been felt by every one who has made such experiments. By the exercise of due precaution, the chances for accident under such circumstances, may doubtless be greatly reduced; yet the consequences which may result from a single mishap are liable to be so serious (as the fate of the lamented Mansfield gives painful evidence, although I believe he was using a metallic retort at the time of the fatal occurrence), that it seemed to me desirable to devise means by which such experiments may be conducted with safety; especially as the chemist has so frequently to resort to protracted fractional distillation of complex mixtures of inflammable substances, as his only means by which to effect a separation.

I find that a lamp may be constructed on the principle of Davy's safety-lamp for miners, so as to afford the important desideratum of safety, and at the same time combine utility and convenience for general use, in cases where a broad open flame and a diffused heat are desirable. Simple modes of applying the principle will readily suggest themselves.

It is only requiste that the flame should be properly enclosed, and so placed and adjusted in relation to other parts of the lamp, that no part can become excessively heated, and yet so as to afford sufficient heat for any work of the kind that may be presented,—the openings below and above for the supply of air and excape of the products of combustion, being securely covered with fine wire gauze, of about 2,500 meshes to the square inch. With certain slight alterations, the lamp figured under "Gaskochlampen" in J. F. Luhme & Co.'s, Berlin, catalogue of chemical apparatus—a medium size of which is represented in the annexed figure—makes a cheap and convenient lamp of this kind. As they may not be on sale in this country, a partial description, for the convenience of those who may desire to have them made, may not be amiss.

The sides are of a single piece of sheet iron, riveted together where the ends meet; the upper and lower edges are bent respectively upward and downward so as to stand in a good position to receive the movable brass rings, *a a*, which serve to hold firmly the wire gauze with which the top and the bottom of the lamp are covered.

As the wire gauze will occasionally require to be renewed, this simple mode of construction seems a very convenient one, as the movable rings may readily be taken off and replaced whenever new gauze is needed.

The tubulure, *b*,—which may be closed with a cork—serves for the introduction of a match for lighting. The nipple, *c*, communicates in the interior with a ring, 2½ inches in diameter, made of copper tube, and placed in the centre of the lamp, 3½ inches below the upper gauze, and provided with small perforations in the upper side, for escape of the gas. The height of the lamp, between the upper and lower sheets of gauze, is 5½ inches; its width across the top 4 inches, and across the bottom 6 inches.

The only alterations which I have made, consist in the addition of the tubulure, *b*, and the wire gauze across the bottom. It is obvious that they do not at all interfere with the use of the lamp as originally intended. It may still be ignited outside the gauze, so as to give a broad, open, blue flame. When used as a safety-lamp it is, of course, to be lighted inside, and furnishes a circuit of small luminous flames, but which afford sufficient heat for any purpose for which a safety-lamp is conceived to be desirable.

To show the confidence which one may repose in the safety of such a lamp, I may add that I have repeatedly tested one by heating a fatty oil to ebullition—during which the gauze immediately under the retort would acquire a dull red heat—and then pouring boiling ether upon the different parts of the lamp, without, in a single instance, being able to ignite it outside the gauze. A portion of the ether would fall through and burn in the interior, while some would lie in the spheroidal state upon the gauze itself, until evaporated: showing that, if one were distilling such a substance, even with such an excessive heat in the lamp, the retort might break, and its contents fall through upon the lamp without any kind of danger. A similar safety-lamp could easily by constructed for using alcohol instead of gas. Boston, February, 1862.—*Silliman's Journal.*

ON COLORING MATTERS DERIVED FROM COAL TAR.

BY W. H. PERKIN, ESQ.

(*From the Quarterly Journal of the Chemical Society.*)

The subject of the present communication is one which is remarkable for the very rapid progress it is making. Previous to the year 1856, the coloring matters derived from "Coal Tar products" were practically unknown; but, owing to recent discoveries, they now rank amongst the most important coloring matters employed. Only a few of them, however, are actually used by the dyer and printer; the rest have merely a scientific interest, and for reasons presently to be mentioned, are not likely to acquire any other.

The coal-tar products which have up to the present yielded coloring matters are numerous. The following is a list of the most important, which are obtained, either directly or indirectly, from coal-tar:

Aniline and its Homologues,
Carbolic acid,
Chinoline or Quinoline,
Naphthaline, and
Pyrrole bases.

I.—Aniline.

Aniline was discovered in 1826, by Unverdorben. The original method employed for its preparation was by digesting indigo with hydrate of potassium, and subjecting the resulting product to distillation. Aniline was also obtained from the basic oils of coal-tar. But the process which is now employed for its preparation is a remarkable instance of the manner in which abstract scientific research becomes in the course of time of the most important practical service.

Benzole was discovered by Faraday, who obtained it from oil gas. After this, it was produced by distilling benzoic acid with baryta, which result determined its formula, and was the cause of its being called benzole. After this, Mansfield found it to exist very abundantly in common coal-tar naphtha, which is the source from which it is now obtained in very large quantities.

Benzole, when studied in the laboratory, was found to yield, under the influence of nitric acid, nitrobenzole. Zinin afterwards discovered the remarkable reaction which sulphide of ammonium exerts upon nitrobenzole, converting it into aniline; and, lastly, Bechamp found that nitrobenzole was converted into aniline when submitted to the action of ferrous acetate. It is Bechamp's process which is now employed for the preparation of aniline by the *ton*. Had it not been for the investigations briefly cited above, the beautiful aniline colors, now so extensively employed, would still be unknown.

When I discovered aniline purple, nitrobenzole and aniline were only to be met with in the laboratory. In fact, half a pound of aniline was then esteemed quite a treasure; and it was not until a great deal of time and money had been expended, that I succeeded in obtaining these substances in large quantities, and at a price sufficiently low for commercial purposes.

The coloring matters obtainable from aniline are numerous. They are the following:

Aniline Purple,	Alpha-aniline Purple,
Violine,	Bleu de Paris,
Rosine,	Nitrazophenyline,
Fuschine,	Dinitraniline,

and Nitrophenylene-diamine.

Aniline Purple.

Generally known as Tyrian Purple, Mauve dye, Phenamine, Indisine, &c.

It has been known for many years that the hypochlorites react on aniline and its salts, producing a purple solution. In fact, hypochlorites are the distinguishing test for aniline; but nothing definite was known of the nature of this purple solution, it being simply stated that aniline produced with hypochlorites a purple liquid, but that its color was very fugitive.

As many very absurd statements have been made respecting the discovery of aniline purple, I will just briefly mention how it was that I first became acquainted with it.

In the early part of 1856, I commenced an investigation on the artificial formation of quinine. To obtain this base, I proposed to act on toluidine with iodide of allyl, so as to form allyl-toluidine, which has the formula:

$$\left.\begin{matrix} C_7H_7 \\ C_3H_5 \\ H \end{matrix}\right\} = C_{10}H_{13}N,$$

thinking it not improbable that by oxidising this, I might obtain the desired result, thus:

$$\underbrace{2(C_{10}H_{13}N)}_{\text{Allyl-toluidine.}} + O_3 = \underbrace{C_{20}H_{24}N_2O_2}_{\text{Quinine.}} + H_2O$$

For this purpose, I mixed the neutral sulphate of allyl-toluidine with bichromate of potassium; but, instead of quinine, I obtained a dirty reddish brown precipitate. Nevertheless, being anxious to know more about this curious reaction, I proceeded to examine a more simple base under the same circumstances. For this purpose I selected aniline, and treated its sulphate with bichromate of potassium. This mixture produced nothing but a very unpromising black precipitate; but, on investigating this precipitate, I found it to contain that substance which is now, I may say, a commercial necessity, namely, *aniline purple.*

The method adopted for the preparation of aniline purple is as follows: Solutions of equivalent proportions of sulphate of aniline and bichromate of potassium are mixed and allowed to stand till the reaction is complete. The resulting black precipitate is then thrown on a filter and washed with water, until free from sulphate of potassium. It is then dried. This dried product is afterwards digested several times with coal-tar naphtha until all resinous matter is separated, and the naphtha is no longer colored brown. After this it is repeatedly boiled with alcohol to extract the coloring matter. This alcoholic solution when distilled leaves the coloring matter at the bottom of the retort, as a beautiful bronze-colored substance.

Before speaking further of the coloring matter, I will just describe the secondary, or, more properly, the primary products of the action of bichromate of potassium on sulphate of aniline, as nearly nine-tenths of the aniline employed in the preparation of aniline purple are converted into these useless substances.

These products are two in number, namely, the resinous matter which is separated from the black precipitate by means of coal-tar naphtha, and the residue which is left after the coloring matter has been extracted. The resinous matter, when separated from the coal-tar naphtha, consists of a brownish black pitch, which is fusible when heated. It is soluble in alcohol, ether, turpentine, bisulphide of carbon, and many similar solvents. It possesses one remarkable property, viz., that when its solutions in hydrocarbons are acidified with strong acids and well agitated, all the resinous matter is thrown out of solution and precipitated. Alkalies render it soluble again. These facts would make it appear to be a weak organic base.

This substance contains about ten per cent. of nitrogen. It dissolves in fuming nitric acid, and by ebullition yields a yellowish brown acid. Anhydrous bichloride of tin, when heated with it, does not yield any coloring matter.

The residue which is left after the coloring matter has been separated is a purplish black powder. It contains about thirty per cent. of oxide of chromium. It is insoluble in all solvents, with the exception of strong acids, and is remarkable for the readiness with which it takes fire. It has been used for the manufacture of black paint and printer's ink. As it contains large quantities of carbon and oxide of chromium, it would form a most valuable product for the preparation of anhydrous chloride of chromium.

The aniline purple prepared according to the process just described, although suitable for practical purposes, is not chemically pure. If required pure, it is best to boil it in a large quantity of water, then filter the resulting colored solution, and precipitate the coloring matter from it by means of an alkali. The precipitate thus obtained should be collected upon a filter, washed with water until free from alkali, and dried. When dry it is to be dissolved in absolute alcohol, the resulting solution filtered, and then evaporated to dryness over the water bath.

Thus obtained, aniline purple appears as a brittle substance, having a beautiful bronze-colored surface; but if some of its alcoholic solution be evaporated on a glass plate, and viewed by transmitted light, it appears of a beautiful bluish violet color. If considerable quantities of an alchoholic solution of the coloring matter containing a little water be evaporated to dryness, the surface of the coloring matter next to the evaporating dish, often exhibits a golden green appearance when detected.

Aniline purple is difficultly soluble in cold water, although it imparts a deep purple color to that liquid; it is more soluble in hot water; but its hot aqueous soluton, when left to cool, assumes the form of a purple jelly. It is very soluble in alcohols, though nearly insoluble in ether and hydrocarbons. Aniline dissolves it readily. In properties it seems to be slightly basic, as it is more soluble in acidulated than in pure water. Alkalies and saline substances precipitate it from its aqueous solutions as a dark purplish black powder. Bichloride of mercury precipitates it in a very finely divided state. A little of this precipitate (which appears to be a double compound of chloride of mercury and coloring matter) when suspended in water, and viewed by transmitted light, appears of a blue or violet color.

A small quantity of hydrate of potassium or sodium added to an alcoholic solution of the coloring matter causes it to assume a violet tint, but without effecting any change in the coloring matter itself. Ebullition with alcoholic potash does not decompose it.

Aniline purple dissolves in concentrated sulphuric acid, forming a dirty green solution which, when slightly diluted, assumes a beautiful blue color; excess of water restores it to its original purple color. It may even be heated for an hour to 100°C. with Nordhausen sulphuric acid without suffering decomposition, being restored to its original color by means of water, and possessing precisely the same properties it had before being subjected to this powerful agent. Hydrochloric acid acts upon it in the same manner as sulphuric acid. It is decomposed by chlorine, and also by fuming nitric acid. Bichloride of tin is without action upon it.

Powerful reducing agents have a peculiar action upon this coloring matter, somewhat analogous to the action of reducing agents on indigo. An alcoholic solution of sulphide of ammonium, mixed with an alcoholic solution of aniline purple, causes it to assume a pale, brownish tint. This solution, when brought in contact with the atmosphere, instantly recovers its original beauty and intensity of color. An alcoholic solution of the coloring matter mixed with a little protoxide of iron, changes to a pale brown color. This solution also becomes purple when exposed to the action of the atmosphere; sulphurous acid does not affect the color of this substance.

Aniline purple forms a remarkable compound with tannin. When an aqueous solution of it is mixed with a solution of tannin, precipitation takes place. The precipitate thus formed, after having been well washed, no longer possesses the properties of the pure coloring matter. It is insoluble in water. Like the pure aniline purple, it dissolves in concentrated sulphuric acid, forming a dirty green liquid; but on adding an excess of water to this solution, the new compound is precipitated unchanged; this compound is rather duller in color than the pure coloring matter itself.

Aniline purple, when agitated with a little moist binoxide of lead, is transformed into *rosine*. It is remarkable for its intensity of color, a few grains of it coloring a considerable quantity of spirits of wine.

VIOLINE.

This coloring matter, which is a product of the oxidation of aniline, was first obtained by Dr. D. Price, who prepares it by heating an aqueous liquid containing two equivalents of sulphuric acid, and 1 eq. of aniline to the boiling point, and then adding 1 eq. of binoxide of lead, boiling the mixture for some time, and filtering it while hot. The filtrate, which is of a dark purple hue, is boiled with potash, both to separate the excess of aniline, and also to precipitate the coloring matter; when all the free aniline has volatilized, the residue is thrown on a filter and slightly washed with water, and then dissolved in a dilute solution of tartaric acid. This solution, after filtration, is evaporated to a small bulk, re-filtered, and then precipitated by means of an alkali.

Thus obtained, violine presents itself as a blackish purple powder, which, when dissolved in alcohol and evaporated to dryness, appears as a brittle bronze-colored substance, similar to aniline purple, but possessing a more copper-colored reflection. It is even less soluble in water than aniline purple. It is very soluble in alcohol, but insoluble in ether and hydrocarbons. Its solutions possess a color somewhat similar to that of the field violet. Concentrated sulphuric acid dissolves it, forming a green solution, but excess of water restores it to its original color.

The color of violine, like that of aniline purple, is destroyed by reducing agents, but restored by the action of the atmosphere. Tannin produces an insoluble compound with it. When agitated with a small quantity of binoxide of lead, it is converted into aniline purple; excess of this re-agent changes it into roseine.

ROSEINE.

This substance almost always accompanies aniline purple, though in very small quantities. It was first noticed publicly by C. Greville Williams, and afterwards by Dr. D. Price. Williams used manganates for its preparation, but Dr. D. Price prepared it by means of binoxide of lead; his process is as follows: To a boiling solution of 1 equivalent of sulphate of aniline, 2 equivalents of binoxide of lead are added, and the mixture is boiled for a short time. The rose-colored solution is then filtered, and the filtrate evaporated to a small bulk, which causes a certain amount of resinous matter to separate. This evaporated solution is then filtered, and the coloring matter precipitated by means of an alkali; it is then collected on a filter, slightly washed, and then dried. The coloring matter thus prepared readily dissolves in alcohol, forming a fine crimson-colored liquid which, when evaporated to dryness, leaves the coloring matter as a dark brittle substance, having a slightly metallic reflection. It is much more soluble in water than either aniline purple or violine, but like them, it is insoluble in hydrocarbons, and more soluble in acid than in neutral liquids. Concentrated sulphuric acid dissolves it, forming a green solution; excess of water restores it to its original color. It forms a compound with tannin, and is also decolorized, or nearly so, by powerful reducing agents.

The three coloring matters just mentioned, viz., aniline purple, violine, and roseine, are evidently closely allied, for they have nearly the same properties. They are all formed under similar circumstances, namely, by the action of oxidizing agents in the presence of water. They are all slightly soluble in water, though, as the shade of color becomes redder, so does their solubility increase. Alkalies precipitate them from their aqueous solutions. Concentrated sulphuric acid dissolves them all, forming green solutions, which excess of water restores to the original color of the coloring matter; powerful reducing agents deprive them of their color (or nearly so), but it is restored by the influence of oxygen; and lastly, tannin forms insoluble compounds with them all.

(*To be continued.*)

Gas-Works in Factories.—The extensive paper mills of Messrs. Jessup & Moore, of Philadelphia, one situated at York, Pa., and the other on the Brandywine, Kent Co, Delaware, are lighted with gas made on the premises. The capacity of each of these works is 1,200 cubic feet per 24 hours. The paper on which this Journal is printed is manufactured by this well-known firm.

Ventilation of Mines.—A sum of 200 guineas is offered by the National Association for the Relief of British Miners to any engineer or other person who projects and carries into effect the best and most effective plan for the full and perfect ventilation of mines.

SEWER VENTILATION AND DEODORIZATION.

CHARCOAL FILTERS.

An official report has been made by Mr. Haywood, the engineer and surveyor to the City Sewers Commission, and Dr. Letheby, their medical officer of health, as to the experiment with charcoal in sewer deodorization and ventilation on Dr. Stenhouse's principle, to which we lately drew attention.

The district experimented upon is in the eastern portion of the city. It includes a space bounded by Bishopsgate street on the west, from Cornhill to Widegate street; by Middlesex street and Somerset street, on the east, to the city boundary; and by the Minories and then by Leadenhall street to Cornhill on the south; the whole of the main thoroughfares above-named being included in the area. It comprises a space of about fifty-nine acres, with about 1,700 houses, and about 14,000 inhabitants.

The points to which attention was directed by the two reporters, were the following—

"1st. The deodorizing power of the charcoal.

2d. The length of time that the same charge of charcoal will continue to deodorize the sewer gases.

3d. The effect the air-filters have on the ventilation and temperature of the sewers.

4th. The exact cost of the experiment, so as to obtain data from which to estimate the probable expense of the process if it were applied to the whole city, or even to the metropolis."

The deodorizing power of the charcoal (continues the report), has been satisfactorily proved to be complete. Not only have there been no complaints from the public of stenches from the ventilating gratings, but we have ascertained by actual observation, that the odor of the sewer gases is not preceptible when they have traversed the charcoal.

As to the duration of the powers of deodorization, the reporters state that they have hardly sufficient proof. The charcoal seems to lose much of its power when saturated with water; this we ourselves anticipated. If kept dry, the charcoal would not require renewel oftener than once a year; but in the existing circumstances, it required renewal once a month.

As to the effect of the air-filters on ventilation, the reporters state that they cannot give a very positive opinion. The ventilator did not seem to be so perfect as in other cases; but the differences as to temperature which denoted a difference of degree in ventilation, were extremely slight. Danger to workmen in the sewers has not been materially increased by the application of charcoal to the ventilators. The reporters recommend charcoal respirators for the use of these men.

With respect to the cost of the process: The expenditure incurred in fitting up the 104 ventilating shafts, was £918 18s. 5d., which is at the rate of about £8 16s. 8d., per ventilator; but an experiment, it is remarked, is necessarily more costly than an established system; and a much less sum than this may be taken as a fair average of the probable expense of extending the process even to the whole of the city. The total expense of reparation and renewel of damaged trays, frames, and coverings, averaged 16s. 6d. per ventilator per annum. The cost of supervision, supplying and changing the charcoal, was 8s. 9d. per ventilator, making together, £1 5s. 3d. per ventilator, per annum. The very large cost for reparation was mainly attributable to the repeated breakage of one class of apparatus used. This item might, therefore, at a future day, be considerably lessened.

The general conclusions from these experiments, and from the consideration of collateral evidence, are,—

"That dry charcoal in the presence of atmospheric air is a powerful means of destroying the mephitic gases and vapors of sewers and house drains; that the charcoal filters may be used with efficacy in the course of the air channels from the drains and closets of houses, as well as in the ventilation of the public sewers; that, in applying the charcoal, those contrivances should be used which offer the least resistance to the free passage of the air; and, lastly, that the situation of the filters is best when the charcoal is protected from wet and from dirt, and is easily accessible."—*London Builder.*

RAIN FOLLOWING THE DISCHARGE OF ORDNANCE.—At a recent meeting of the Manchester, England, Literary and Philosophical Society, Mr. Baxendell made the following communication:

A paragraph headed "*Rain Following the Discharge of Ordnance*," appears in the number of the London *Review* for November 16th, 1861. In this paragraph, some new facts drawn from the American war, are adduced by Mr. J. C. Lewis, in support of the view that a violent concussion of air by the discharge of heavy artillery, has a tendency to cause a copious precipitation of rain. Now, if we may be allowed to regard this effect as an established fact, it seems to me to be one of some interest in connection with the disputed question whether in thunder-storms, a discharge of lightening is the cause or consequence of the sudden formation of a heavy shower of rain. Almost every day's experience, in this climate, at least, shows that the production of rain is not dependent upon sudden discharges of electricity from the clouds; and no evidence has ever been brought forward to prove that a high degree of electrical tension in a cloud, has a tendency to prevent the resolution of the cloud into rain. Heavy showers often fall from highly electrified clouds without any visible discharge of electricity taking place. We are, therefore, not entitled to assume that the sudden diminution of the electrical tension of a cloud by a lightning discharge, can have any material influence upon the rain-forming processes going on in the cloud. As, however, very heavy showers of rain do almost invariably follow lightning discharges, it seems necessary to seek some other cause to account for them. But if we admit that a violent concussion of the air has a tendency to facilitate the conversion of rain-forming material into actual drops of rain, then we may well suppose that the violent concussions produced by lightning discharges, acting on such enormous and dense masses of rain-forming material, as are usually collected in heavy thunder-clouds, are amply sufficient to produce these sudden and heavy showers of rain. I am aware that the effect of a discharge of ordnance is usually supposed to be produced by an upward current of air caused by the heat and the gasses evolved during the combustion of gunpowder; but as an hour's sunshine through an opening in the clouds, especially when the sun is at a considerable altitude, would produce a much greater effect in heating and increasing the bulk of air, this cannot be received as the true explanation of the mode in which the effect of a discharge of heavy artillery is produced.

FIRES RESULTING FROM THE USE OF ILLUMINATING AGENTS.—In the report of Fire Marshal Baker, for the six months ending November, 1861, the number of fires attributed to the use of illuminating agents is as follows:

Camphene and fluid lamps	11
Gas-light	3
Gas-pipe	1
Kerosene oil lamp explosion	1
Light in closet	1

The total number of fires and alarms for this period was 200. Fewer explosions of kerosene oil lamps have occurred than were noticed in the last semi-annual report. The Marshal attributes this result to increased care on the part of refiners of these oils, who pay more attention to extracting the light and dangerous hydrocarbons from their product.

PETROLEUM IN ENGLAND.—In Shropshire, England, there is a rock known to the people as "stinking rock," which yields, on distillation, a great deal of tar. Mr. Shepherd thinks a large yield may be counted on from this source.

PATENTS.

UNITED STATES.

34,426.—G. W. Howard, of Pontiac, Mich., for Improvement in Oil Tanks:

I claim constructing an oil tank with an open bottom, in combination with buoys or floats, substantially in the manner described, whereby the upper edge of the tank is always kept above the surface of the water, and the tank may readily be floated from place to place, or rise and fall with the tide, as described.

34,444.—James Old, of Pittsburgh, Pa., for Improvement in Pumps for Deep Wells:

I claim the use of a hollow piston-rod or pipe, extending through the lowest valve, as well as through the upper valve or plunger of pumps, and furnished with a valve at top of the hollow piston-rod or gas-pipe, constructed and arranged substantially as described, for the purpose of allowing of the escape of gas or fixed air from the bottom of deep wells without interfering with the operations of the valves of the pump.

Second, Also the combination of a hollow piston-rod for the plunger of a pump, passing through all the valves of the pump cylinder, with a flexible tube and valve at the top of the hollow piston-rod, constructed substantially as and for the purpose described.

Third, Also the use of a check-valve seated in the pump chamber, directly above and in addition to the ordinary upper and lower pump-valves, for the purpose of sustaining and relieving the plunger of the pressure of the column of oil, or other liquid, in the pump-tube above the valves, when there is a partial vacuum in the pump chamber on the up-stroke of the plunger.

Fourth, Also the use of an air-vessel attached to piston-rod of a pump, for the purpose of checking the too rapid descent of the plunger, and of keeping up the upward flow of the column of water, oil, or other liquid in the pump tube, above the valves, during the descent of the plunger, substantially as described.

34,447.—W. H. Pierce, of East Cambridge, Mass., for Improvement in Guards for Lanterns:

I claim the band or ring, C, as constructed and applied to the ribs c, and made to operate therewith, substantially in the manner and for the purpose set forth.

34,450.—R. N. Stewart, of Philadelphia, Pa., for Improvement in Gas-Burners:

I claim, in combination with the plate, B, arranged as described, the hinged cap, C, and clearing plate, D, constructed, combined and arranged to operate substantially in the manner described, and for the purpose specified.

34,462.—H. P. Gengembre, of Tarentum, Pa., assignor to G. W. Howard, of Pontiac, Mich., for Improved Method of Storing Oils:

I claim the method described of storing oils, in order to prevent leakage from hydrostatic pressure.

I also claim storing oils in tanks constructed with tight sides, but open at bottom and immersed in water, in order to relieve the sides thereof from hydrostatic pressure, substantially in the manner described.

34,465.—Charles Kirk (assignor to Charles Monson and Stillman Moore), of New Haven, Conn., for Improvement in Dry Gas Meters:

I claim so constructing and operating a dry gas meter that the alternate expansion of the two apartments of the double bellows, while it measures the gas will regulate the opening and closing of the valves, which admit the gas alternately into the apartments, to be measured, and after being measured allow it to pass out for use, when the whole is constructed, arranged, and fitted for use, substantially as described.

Second, I claim the method of opening and closing the two pairs of valves, by means of the valve-rod, i, and the helical springs, l and m, when they are arranged, connected, and fitted to produce the result, substantially as described.

Third, I claim the described method of registering the quantity of gas thus measured by the alternate expansion of the two apartments of the double bellows, by means of the slide and clog or hand, substantially as described.

Fourth, I claim the use of the additional bellows, N, to counteract the varying pressure, in the main, when fitted to close its induction valve by its own expansion, and to allow it to be opened by its own contraction, substantially as described.

34,475.—J. L. Beers and Samuel Leonard, of Fayette, Pa., for Improvement in Water Wheels:

We claim the concave chute, F, arranged as described, in combination with the superincumbent penstock, C, and the wheel, A, substantially as and for the purpose set forth.

34,476.—W. H. Bliss, of Newport, R. I., for Improvement in Hose Couplings:

I claim, first, Connecting the nut, D, with the pin, F, by means of the divided collar, E, fitted in the nut and to the pin, substantially as shown and described, when said connection is used in combination with the pin, F, and the groove, g, of but, B, for the purpose specified.

Second, The lug, G, within the but, A, when used in connection with the pin, F, and the groove, g, of the but, B, substantially as and for the purpose set forth.

34,485.—J. G. Fredenburr and J. L. George, of Columbia, Cal., for Improved Water Wheel:

We claim the arrangement of the ledges, h, and the guide plates, l, with the sliding buckets, d, chute, E, and its enlargement, g, as shown and described.

The arrangement of the encompassing bar, F, with the buckets, d, and the chute, E, as shown and described.

34,499.—John Holmes, of Boston, Mass., for Improvement in Coal Sifters:

I claim the flexible sifter constructed substantially in manner and so as to operate as specified.

34,505.—W. S. Kelly, of Schenectady, N. Y., for Improvement in Pumps:

I claim, first, The combination with the chambers, A B, of a double-acting pump, of a hollow piston rod, G, and piston, F, the valves, g, of the piston, F, being arranged between upper and lower passages, d i, and the same set of valves, g, serving alternately for closing said upper and lower passages, substantially as and for the purposes described.

Second, The combination of an annular spider, H, and screw plate, I, with the hollow piston, F, and ball valves, g, substantially as and for the purposes set forth.

Third, Constructing the annular spider, H, with its arms, f, of greater depth than the depth of its ring or hollow hub, e, substantially as and for the purposes set forth.

Fourth, The combination of the base valve box, D, having a narrow stop bar, a, over the centre of each of its valve chambers, with the double-chambered pump, A B, hollow piston, F, and piston rod, G, substantially in the manner and for the purpose described.

Fifth, The combination of the hollow piston, F, and hollow piston rod, G, with a stationary air-chamber, J, by a stuffing-box, j, at the lower end of the chamber, J, substantially as and for the purposes set forth.

34,507.—C. T. Judkins, of Boston, Mass., for Improvement in Gas Regulators.

I claim the combination and arrangement of the valve, H, with the pivoted or hinged cover, E, the lever, O, and adjustable balance weight, L, substantially as and for the purpose and objects set forth.

34,521.—W. J. Palmer, of Flushing, N. Y., for Improvement in Lamps, &c.:

I claim the combination with the cold air or draught chamber, C, of the dome-shaped gas-condensing channel, c, as and for the purpose shown and described.

34,529.—E. S. Scripture, of New York City, for Improvement in Oil Cans:

I claim, first, The use or employment of the protecting ring, C, provided with the spring rests, D D, arranged and operating as shown for the purpose specified.

Second, The bottom, B, regulating screw, H, and spring, F, supported upon the rests, D D, or their equivalents, when the same shall be combined and operated in the manner and for the purpose specified.

34,557.—J. A. Bassett, of Salem, Mass., for Improved Apparatus for Carbureting Gas:

I claim, first, The combination, substantially as described, of a vessel, A, in which the gas passes circuitously over the surface of the hydrocarbon liquid, to be partly carbureted and cooled by the evaporation of the liquid, and a vessel, B, containing a porous substance, and saturated with such liquid, through which the gas subsequently passes, as set forth.

Second, The gas regulating valve, j, and float, k, combined with a gas naphthalizing or carbureting apparatus, substantially as specified, that is to say, with the float floating in the naphtha or other hydrocarbon liquid used for the carbureting process.

34,562.—R. S. Chapin, of New York City, for Improvement in Lamps:

I claim, in combination with the wick tube, constructed as aforesaid, the deflecting cap, e, applied in the manner and for the purpose specified.

34,577.—Samuel Jarden, of Baltimore, Md., for Improved Odorizer of Kerosene Oil:

I claim the manner of odorizing kerosene oil, as stated, or by combination with said essential oils in greater or less proportions, if the said manner of odorizing be substantially the same.

34,582.—P. W. Mackenzie, of Jersey City, N. J., assignor to Addison Smith, of New York City, for Improved Gas Compensator:

I claim the use of the compensating plates, A A, the connecting and adjusting rods, g and j, in combination with the valve, s, and circular valve seat, d d, or its equivalent, with long narrow ports, s s, the whole substantially as set forth.

34,600.—W. W. St. John, of Pleasant Mount, Mo., for Improvement in Current Water Wheels:

I claim fitting the pairs of buckets, g h and i k, when arranged at right angles upon the adjustable block or hub, f, in the manner specified, so that said buckets, by the adjustment of the block, can be so placed as to return above the surface of the water, while the buckets in action are immersed as much as possible, as set forth.

34,607.—G. M. Zell, of Waynesville, Ohio, for Improvement in Water Elevators:

I claim the combination of the wheel or pulley, E, spout, J, and bucket, H, provided with the valve, L, and lever, N, when arranged for joint operation, substantially as and for the purpose set forth.

BENZOLE TRACING PAPER.—A very good substitute for tracing paper may be manufactured from ordinary paper by the help of a little benzole. A sheet of ordinary Bath post, moistened with this substance, renders the material perfectly transparent; the tracing may then be effected, and within a short time the volatile fluid will evaporate, and leave the paper perfectly opaque and clear as before. The drawing sustains no detriment by the operation. Gas-engineers, and others, who have much tracing to do, would do well to make a note of this fact.

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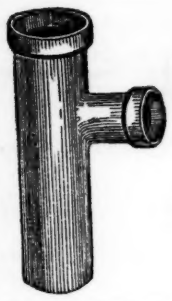

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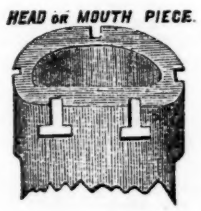

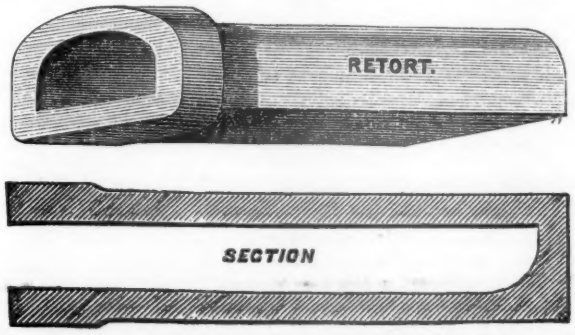

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By great care in Manufacturing, combined with the advantages in Burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

RETORT OVENS, FIRE-BRICKS, GUARDS, SADDLES, RABITTED BURS, FLUES, AND QUARRIES, ARE ALL MANUFACTURED OF THE SAME QUALITY OF CLAY.

EVERY RETORT AND BRICK IS BRANDED "KING BROTHERS, STOURBRIDGE."

Apply to E. W. BARSTOW, 83 Maiden Lane, New York, where samples can be seen.

HARRIS & PEARSON,

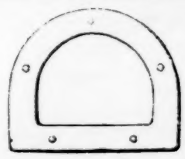
PROPRIETORS OF

Best Glass-House Pot & Crucible Clay.

Manufacturers of Fire-Bricks, Gas-Retorts, and Glass-House Furnace-Bricks of every description.

AMBLECOTE FIRE-CLAY AND BRICK WORKS, STOURBRIDGE, ENGLAND.

COWEN'S PATENT FIRE-CLAY RETORTS.



JOSEPH COWEN & CO.,

BLAYDON BURN, near Newcastle-on-Tyne, England,

Have always been, and are still, the most extensive manufacturers of FIRE-CLAY RETORTS in the United Kingdom, and were the only parties to whom a Prize Medal was awarded at the Great Exhibition, in London, 1851, for

"GAS RETORTS, AND OTHER OBJECTS IN FIRE-CLAY."

J. C. & CO. make Fire-Clay Retorts of all shapes and dimensions, and to fit existing mouth-pieces.

Orders for FIRE-CLAY RETORTS, TILES, BEARERS, and other articles in Fire-Clay, receive immediate attention, and are promptly executed at their Works, as above. Drawings of Settings adapted for Cowen's Patent Fire-Clay Retorts supplied.

AGENTS, MESSRS. MEAD & BELL,

13 CLIFF STREET, NEW YORK.

N. B.- J. C. & CO.'S RETORTS are well adapted for small Gas-Works, as they can be used without an Exhauster.

By Her Majesty's Royal Letters Patent.

PATENT BITUMINIZED PIPES,

For the Conveyance of Water, Gas, and Drainage.

OFFICES: 14A CANNON STREET, LONDON, C.E.

FREDERICK W. BOND, SOLE AGENT, No. 58 LIBERTY STREET, NEAR BROADWAY, NEW YORK.

This important invention, patented by Mr. Charles Newbold, and now for the first time introduced to the notice of the British and American public, may confidently be stated to be one of the greatest interest and commercial value, as the Patent Bituminized Pipes possess all the qualities necessary for the conveyance of Water, Gas, Sewage, Mine-Pumps, &c., viz.: great strength, great durability, and inoxidability, with the immense advantage of being about *one fifth* the weight of iron pipes, and about 35 per cent. cheaper; whilst, compared with lead pipes, the Bituminized Pipes are only about *one fourth* their price, without the possibility of the formation of the oxide and carbonate of lead, so dangerous for every purpose. They will stand 150 degrees of Heat, and after many trials it has been satisfactorily proved that rats or vermin will not touch them. They also withstand the action of all acids and salts.

Iron pipes are at present frequently covered with a coating of bitumen or coal tar before they are laid down; but the adherence of this coating to the metal being very imperfect, on account of vibration and the difference of expansion, this preservation is insufficient, besides being exposed to a number of influences which neutralize its efficacy—galvanic currents materially assist the formation of oxides and deposits, which cause the obstruction and eventually the destruction of metallic pipes.

The Patent Bituminized Pipes are neutral, non-conductors of electricity, and consequently are not exposed to any of the deteriorating influences mentioned above. The process of manufacture of these Pipes consist in causing a roll of paper to pass through a reservoir of melted bitumen, after which it is tightly coiled around a mandril to any required thickness; and thus, when hardened, a tube is formed of perfect texture, great hardness, and enormous strength. These Pipes are proved, by hydraulic pressure, to resist a pressure of 220 lbs. to the square inch, equal to 506 feet head of water, which is more than double the altitude of the highest reservoir in London. The bituminous composition which unites and covers these Pipes is so well known as an excellent preservative, that it will be unnecessary to demonstrate that, when laid underground, the durability of the Patent Bituminized Pipes may be considered as unlimited. The Pipes are made in lengths of seven feet, and are connected by socket joints of the same material as the Pipes; or they can be fitted with iron flanged sockets, screwed together in a most simple and inexpensive manner.

For Gas these Pipes are invaluable; the Gas-lining which we insert effectualy resists the action of Gas, and being non-conductors, there can be no condensation in them, and the joints made with the Patent Cement are so strong as to entirely prevent Leakage.

The cost of laying the Pipe is also small, compared with those of iron, and can be done by mere laborers. Although only now introduced into England, the Bituminized Pipes have been in use on the Continent during the last three years, and those which have been employed in Paris for the conveyance of gas have been ascertained to be as perfect now as when first laid down.

DIRECTIONS FOR JOINING THE PATENT BITUMINIZED PIPES.

Pack the pipes level in the ordinary way; slip the collar over one of the pipes; draw the ends close together and warm them by putting a hot iron between them; then press them together so as to make them adhere; take a piece of iron wire netting, about half an inch in the mesh, a little narrower than the length of the collar, and long enough to wrap once round the pipe, spread the collar over it and the joining; close the ends with clay; pour the melted cement into the manhole of the collar, and fill up the interior space; then remove the clay and the joint is finished.

It is necessary to leave a small vent hole in the clay at each end of the collar to allow the air to escape as the cement is poured in, that there may be no flaws or air bubles in it when cold. If in cooling the cement settles in the manhole, fill up again.

N. B.—The cement should be broken into small pieces and melted in a pot as you do lead, at a low temperature, until it is dissolved; it must be stirred while melting; then take it off and keep stiring it as it cools until it becomes nearly as liquid as water; then pour quickly.

All Orders should be addressed to the

Patent Bituminized Water, Gas, and Drainage Pipe Company, Limited,
14A Cannon Street, London, C.E.,
ALEXANDER YOUNG,
Managing Director;

or to FREDERICK W. BOND,
Sole Agent, 58 Liberty Street,
(Between Broadway and Nassau Streets,)
NEW YORK.

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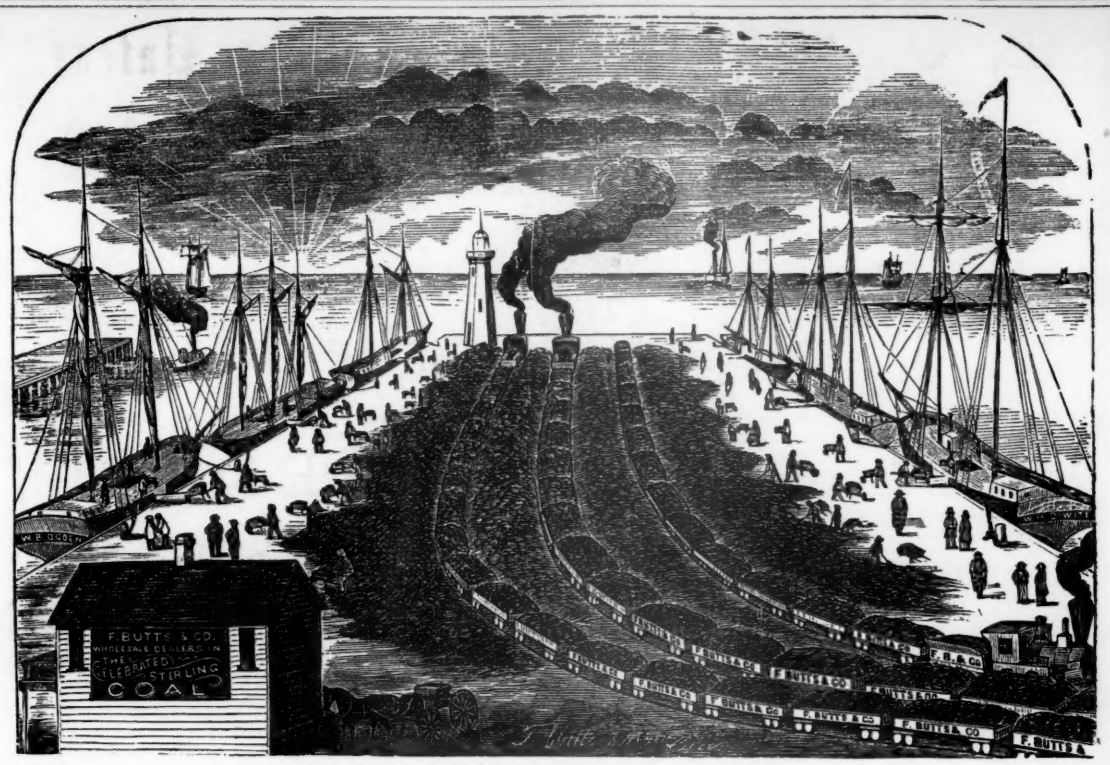
Inside Diameter.....	2-in.	3-in.	4-in.	5-in.	6-in.	7-in.	8-in.	9-in.	10-in.	12-in.	16-in.	20-in.	24-in.	30-in.	36-in.
Price per Foot, including Collars..	s. d. 0 4	s. d. 0 6	s. d. 0 8	s. d. 0 11	s. d. 1 2	s. d. 1 5	s. d. 1 8	s. d. 2 0	s. d. 2 4	s. d. 2 8	s. d. 4 2	s. d. 6 0	s. d. 8 6	s. d. 11 0	s. d. 13 0

Cement for Joining, For Sale as above.



(View of F. Butts & Co.'s Coal Pier, Cleveland, O., on the Government and Cleveland & Pittsburgh R.R. Piers at the mouth of the Cuyahoga River, Lake Erie.)

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(Successors to BUTTS & KENDALL,)

DEALERS IN THE CELEBRATED

STERLING COAL!

PITTSBURGH, AND OTHER GAS COALS,

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Dear Sir:—We beg leave to call your attention to the following, from which, and others, (and the universal expression of Gas men, as to the superior quality of Sterling Coal,) we believe that it is the best Gas Coal in the country.

From the MANHATTAN GAS LIGHT CO., New York.

Gentlemen:—Yours of the 9th inst. is received. The "Sterling Coal" received from you during the past year worked very satisfactorily—averaging 9,520 cubic feet of 15 candle Gas per ton of 2,240 lbs., and 41 bushels of Coke weighing 1,465 lbs.

We consider it among the best of American Gas Coals, for the quantity and quality of the Gas produced, and also for the excellent quality of its Coke.

I am Gentlemen, Your Obedient Servant, CHARLES ROOME, President.

From the OGDENSBURGH GAS CO., Ogdensburgh, N. Y.

January 6, 1862.

Messrs. F. Butts & Co.—This Company has used your Sterling Coal since July, 1860. We consider it the best Coal we have ever used; gives us larger yields of Gas, requires less lime, and makes a superior Coke. Respectfully, Yours, R. E. GORDON, Sup't Og. Gas Works.

From the RONDOUT AND KINGSTON GAS LIGHT CO., Rondout, N. Y.

January 10, 1860.

Messrs. F. Butts & Co.—Gentlemen:—This Company have used your Coal nearly two years. It is in every respect satisfactory, and to it is given the preference over all other coals. Its average yield is 4 40.100. The light clear and strong. The Gas is easily purified and quite free from sulphur. The yield of Coke is large and of superior quality. It is, in my opinion, equal to any Gas Coal in the market. Very Respectfully, WM. W. HAGUE, Sup't.

From the SANDUSKY GAS CO., Sandusky, O.

January 6, 1862.

Messrs. F. Butts & Co., Cleveland.—Gentlemen:—We have used your Sterling Coal for two years and six months past, and find it superior in quality and all that a number one Gas Coal can be. The illuminating power of the Gas is high, the Coke is of a superior quality, and in many instances our monthly average product has been 4 40.100 per one lb. Coal. It gives us entire satisfaction. I am, Gentlemen, Yours, Respectfully, WILLIAM HUDSON, Sup't and Sec'y.

From the TOLEDO GAS LIGHT CO., Toledo, O.

Gents:—Your favor of the 28th inst. to hand and noted.

The Sterling Coal received from Messrs. Butts & Co., the last summer and fall, fully sustains the character it has as a Gas Coal, from previous use in our works. We think the quality of Gas is very good, a little better than that produced from the Coal had of them the year previous—yielding 8,666 feet per ton of 2,000 lbs., and 36 bushels of Coke of very good quality, well adapted to our use.

Respectfully, Yours, GEO. SPENCER, President.

From the BUFFALO GAS LIGHT CO., Buffalo, N. Y.

Messrs. F. Butts & Co.—The Sterling Coal we have had from you we find to be an excellent Gas Coal. The yield of both Gas and Coke is good. The illuminating power of the Gas is high and the quality of the Coke is very good. ROBERT ROBSON, Foreman Gas Works.

From the CLEVELAND GAS LIGHT & COKE CO., Cleveland, O.

Gentlemen:—This Company has used between 3,000 and 4,000 tons of your "Sterling Coal," and are still using it with very satisfactory results. We find the average product of a ton of 2,000 lbs. is about 8,800 feet of Gas, and about 37 bushels of Coke. The Gas is of good illuminating power and quite free from sulphur or other impurities, one bushel of lime purifying 9,000 feet, and the Coke of vesy superior quality.

The yield of Gas is about the same as from the Pittsburgh Coal, and the Coke is better adapted to our use. Yours, Truly.

T. DWIGHT EELLS, Secretary.

From the ALBANY GAS LIGHT CO. Albany, N. Y.

Messrs. F. Butts & Co.—Gentlemen:—We have been using your "Sterling Coal" at these works for two years, finding it all that is important in Gas-making Coal, as respect yield and quality of Gas, and freedom from sulphur—as much so as any of the Coaking Coal in use. We are disposed to contract for a frrther supply of the same quality.

Very Respectfully, PAUL A. SABBATON, Sup't.

From the TROY GAS LIGHT CO., Troy, N. Y.

Messrs. F. Butts & Co.—Gentlemen:—The Coal we have used for the past year at our works has been mostly "Sterling." It has given us full satisfaction in every respect.

S. S. DAUCHY, Sup't.

The following analysis of "Sterling Coal" was made by Prof. J. Lang Cassels, Professor in the Cleveland Medical College, who stands at the head of his profession as a chemist, and any statement made by him can be relied upon with safety.

Sp. gr.	1,288
Eygremaeric Moisture	1.85
Volative Combustible Matters	34.15
Coke (clear and porous)	64.00
	100
Fixed Carbon in the Coke	62.00
Ashes (yellowish white)	2.00
	64.00

COMPOSITION OF ASHES.

Silex	0.80
Alumini	0.45
Sulphate of Iron	0.75
	2.00
Per centage of Sulphur	0.23

J. LANG CASSELS, M. D.,
Prof. of Chemistry, Clev. Med. Col.

P. S.—The specimen from which the above analysis was made was taken by myself from a car load, and may be regarded as a fair average; in fact, this coal is very uniform in its characteristics. It also yielded 4 per cent. more gas than the Pittsburgh Coal. J. L. C.

We would also refer to Gas Companies in the following places:

New York City (Manhattan and New York Co.'s), Brooklyn, Albany, Troy, West Troy, Rochester, Oswego, Ogdensburgh, Lansingburgh, Newburgh, Rome, Palmyra, Geneva, Yonkers, Rondout, Kingston, Albion, Brockport, Seneca Falls, Elmira and Lyons, in State of New York; Cleveland, Toledo, Sandusky, Norwalk, Oberlin, Salem and Fremont, in Ohio; Detroit, Ann Arbor, Grand Rapids, Kalamazoo, Jackson and Adrian, in Michigan; Coburg, in Canada; Chicago, Ill., and two Companies in Milwaukee, Wisconsin.

STERLING COAL MINES, situated in Pennsylvania, are wholly under our control; the coal mined and sold only by us or our agents. (Agents in every instance having authority over our signature.)

Five years experience in Mining, Sale and use of Sterling Coal, gives us full confidence in asserting there is no Coal that combines all the requisites so largely for a Gas or Smithing Coal as this.

This year we are several hundred yards further in the Mine than last season, and feel assured Sterling Coal will more than sustain the high reputation it has heretofore gained.

Our facilities largely increased for Mining and Shipping, we are prepared to supply the great demand for this Coal on a much more extensive scale.

Not being dependent upon high water for transportation, but receiving our Coal by RAIL, we are at all times prepared to fill orders, and ready to contract for delivery of the Celebrated Sterling Coal, on board Vessel or Cars at Cleveland, or at works of Gas Light Co's, in any of the Northern States or Canada.

Cleveland, *January* 15, 1862. Address— **F. BUTTS & CO., Drawer 74, Cleveland, O.**

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WOODEN PURIFYING TRAYS.

WOODEN TRAYS FOR GAS-PURIFIERS.—The subscriber manufactures the WOODEN TRAYS for GAS-PURIFIERS on the invention of Wm. Combe, *cut from solid wood*, which are found superior to the iron plates formerly used, as being cheaper and more durable. The public are cautioned against the statements of R. G. Hunt, saying he has a patent for the seive itself, published in the AMERICAN GAS-LIGHT JOURNAL, as wholly without foundation. The following letter is from the Commissioner of Patents:

U. S. Patent Office, Jan. 6th, 1862.

Sir—In the matter of interference between the application of Hunt and Combe for patent conically slotted wooden gas-purifiers, appealed from the decision of the Examiner, the Examiners-in-Chief have rendered a decision, bearing date Jan. 4th, 1862. *The Examiners-in-Chief affirm the decision of the Examiner rejecting the first claim of Rich'd G. Hunt, and reverse the decision of the Examiner, rejecting the application of Wm. Combe, assigned to N. O. Hawxhurst.*

Unless an appeal shall be taken from this decision of the Examiners-in-Chief within the next ensuing thirty days, a patent will be allowed to N. O. Hawxhurst, assignee of Combe.

Respectfully, D. P. HOLLOWAY,
Com. of Patents.

All orders for Solid Wood Trays executed at the shortest notice, on reasonable terms, by
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